PACKAGE engineering

Two types of a new polyester film

Stressing functional properties and basic characteristics (including orientation, stretch-lamination) of the two different types of this new film, together with differences in their use. (See page 27)

Packaging with "working departments"

Techniques of using the working departments of a company for packaging, capitalizing on existing sources of packaging information, and tying together the details with a useful form. (See page 32)

Two phases of package weight control

A look at legal requirements throughout the country, leading to basic operating policies (see page 46), and a practical, "how-to" approach, stressing machine accuracy and filler sampling and testing. (See page 52)

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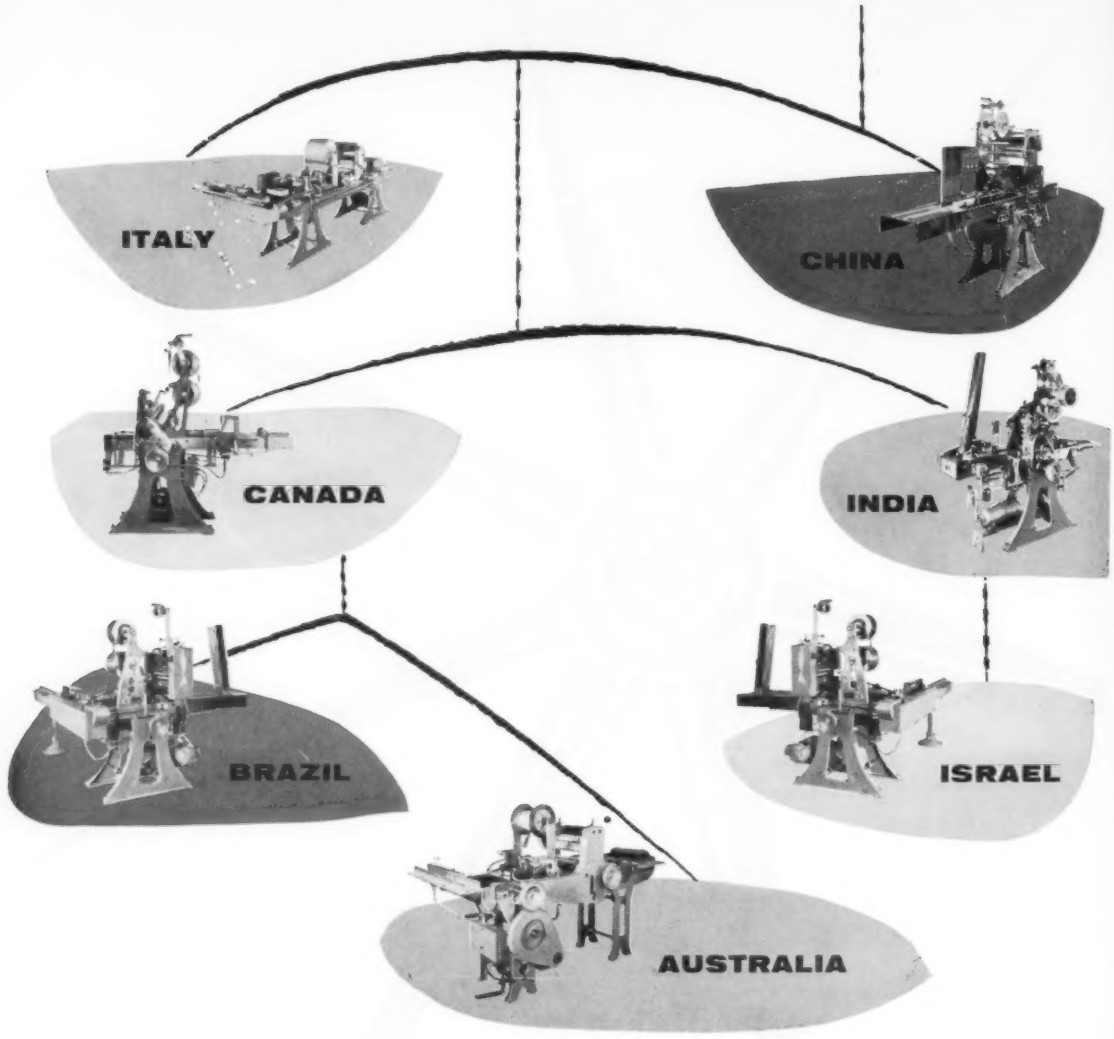
NOVEMBER 1958

Volume [illegible] Number 11



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Aluminum Foil Packaging – Developments in Overwraps

Report No. 18 of a Series by Reynolds Metals Company

WHEN the old-fashioned grocer wrapped a box of kitchen matches in brown paper – that was an early overwrap. But packaging in the modern sense means *pre*-packaging. It was only when the product reached the grocer already wrapped, with the brand name printed on the wrapper, that the age of the overwrap began as we know it today.

Then as now, product protection and identification were the objectives, and today's carton overwraps demonstrate the tremendous progress made along both lines. Reynolds Aluminum Foil overwraps, applied to packages by automatic machines at rates exceeding 100 units per minute, are a far cry from the early paper wraps applied by hand.

The first step in protection, beyond plain paper, was waxed paper. Then came other materials – plastic films such as cellophane and cellulose acetate, and aluminum foil. This latter, which the Reynolds Metals Company was first to develop into overwraps, has proved itself superior in protective qualities – superior even to the newer plastic films.

The best demonstration of this superior protection is by the water vapor transmission rates of various overwraps on finished packages. The comparative rates are shown in the accompanying chart. Here the water vapor transmission rate is expressed in grams of moisture per 100 square inches per 24 hours, when subjected to conditions of 100°F. and 95% relative humidity. Overwraps were on cartons of the conventional type. The various materials are identified on the chart, but a more detailed description of the foil materials follows:

1. 0.00035" aluminum foil glue laminated to a paper. This was the first aluminum foil overwrap and it was necessary to seal it to the carton with an adhesive. Such a wrap is commonly known as "Titewrap".
2. Heat-seal coated 0.00035" aluminum foil glue-laminated to paper. This material not only provided greater water vapor transmission protection through heat sealing, but enabled increased production on automatic packaging machines.
3. Reyseal. This is 0.00035" aluminum foil wax laminated to a porous tissue. The wax not only provides increased water vapor protection, but is also heat sealing as it strikes through the tissue. Intermediate papers or films are used to provide greater strength when needed.
4. Super Reyseal. This is heat-seal coated 0.00035" foil which has been extrusion laminated with polyethylene to a grease proof paper and this combination then wax laminated to a porous tissue. With this Reynolds overwrap, heat sealing is accomplished on all surfaces to provide the greatest protection for the most critical products.

To be noted, on the chart, is the significant decrease in water vapor transmission rate from waxed paper to cellophane to the first simple aluminum foil overwrap and finally to Reynolds Super Reyseal (material 4). In addition to superior moisture protection, all these foil overwrap materials also provide low gas permeability, positive light barrier and grease resistance. Further data on these properties will be found in Reports Nos. 2, 3, 4 and 6 of this series.

As stated above, the second objective of overwraps, besides product protection, is identification – which today has graduated into a new science of shelf display and merchandising. This required the development of new techniques in color printing on foil, and again Reynolds pioneered.

Finally, even with perfected materials and highly developed design and printing facilities, this age of automation required ever farther advances in machinery and equipment systems. In this field, too, Reynolds has pioneered. Your Reynolds representative offers expert counsel on this as on other phases of packaging. Call the nearest Reynolds sales office. Or write **Reynolds Metals Company**, Richmond 18, Virginia.

★ ★ ★

Watch Reynolds new TV shows "Walt Disney Presents" & "All Star Golf" every week on ABC-TV.

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CARTON OVERWRAPS COMPARATIVE WVTR OF
5.90 Wax Paper Heat Sealed
0.67 Cellophane (Approx. 1 Mil.) Heat Sealed
0.46 Foil Wrap 1 Glue Sealed
0.21 Foil Wrap 2 Heat Sealed
0.14 Foil Wrap 3 Reyseal 502 Heat Sealed
0.02 Foil Wrap 4 Super Reyseal Heat Sealed
0
1
2
3
4
5
6
WVTR of Overwrapped Cartons in Grams / 100 Sq. In. / 24 Hrs.
when tested at 100° F. and 95% Relative Humidity.

NOVEMBER 1958 • VOLUME 3 • NUMBER 11

PACKAGE engineering

AN ANGUS J. RAY PUBLICATION

For your calendar

February 20-23. 52nd Annual Exhibit of the Canning Machinery and Supplies Association, Conrad Hilton Hotel, Chicago. Contact: Mr. W. D. Lewis, Secretary-Treasurer, Canning Machinery & Supplies Association, 4630 Montgomery Avenue, Washington 14, D.C. *Telephone: Oliver 6-6979.*

February 21-24. 52nd Annual Convention of the National Canners Association, Conrad Hilton Hotel, Chicago. Contact: Mr. Nelson H. Budd, National Canners Association, 1133 20th Street, N.W., Washington 6, D.C. *Telephone: Executive 3-7030.*

March 31-April 1-2. Annual meeting of the Research & Development Associates, Statler Hotel, Washington, D.C. Contact: Col. Rohland A. Isker, secretary, Research & Development Associates, Food and Container Institute, 1819 W. Pershing Road, Chicago 9, Illinois. *Telephone: Lafayette 3-5500, Ext. 4262.*

April 13-15. AMA National Packaging Conference, Palmer House, Chicago. Contact: Mr. Lawrence A. Appley, American Management Association, 1515 Broadway, New York 36, New York. *Telephone: Judson 6-8100.*

April 13-16. 28th AMA National Packaging Show, Chicago International Amphitheatre, Chicago, Illinois. Contact: Mr. Lawrence A. Appley, American Management Association, 1515 Broadway, New York 36, New York. *Telephone: Judson 6-8100.*

May 17-21. Annual meeting of the Institute of Food Technologists, Bellevue-Stratford Hotel, Philadelphia, Pa. Contact: Col. C. S. Lawrence, Institute of Food Technologists, 176 West Adams Street, Chicago 3, Illinois. *Telephone: Andover 3-6268.*

November 16-18. 21st Annual National Packaging Forum of Packaging Institute, Hotel Statler, New York, N. Y. Contact: Mr. Charles A. Feld, executive director, Packaging Institute, 342 Madison Avenue, New York 17, N.Y. *Telephone: Murray Hill 7-8875.*

Nov. 17-20. Packaging Machinery Manufacturers Institute Show, New York Coliseum, New York. Contact: Hanson & Shea, Inc., One Gateway Center, Pittsburgh 22, Pa. *Telephone: Atlantic 1-8552.*

Articles

27 A new polyester film, by Paul J. Vaughan, manager, chemical products development, chemical products development division, The Goodyear Tire and Rubber Company
Examining the different properties and characteristics of both types of this material, together with distinguishing differences.

32 Three-part packaging system pays off, by Stanley E. Farnham, project engineer, Delavan Manufacturing Company
Combining "working" departments, organizing sources of packaging information, and developing a basic "packaging requirements form" to get an operable system.

38 How to locate optimum placement of cushioning for liquids in glass containers, by Allyn C. Beardsell, president, and Jerome J. Kipnees, assistant to the president, Container Laboratories, Inc.
Second part of a three-part article showing how to place cushioning within a case to prevent bottle breakage—stressing here a means of finding the optimum solution.

46 Realistic policies on package weight control, by William G. Hoskins, Glenn G. Hoskins Company
Basic rules founded on a thorough study of existing state and federal regulations together with results of tests carried out as a basis for the policies recommended.

52 A practical approach to a weight-control program, by John E. Reynolds, industrial engineer, The Tool Steel Gear and Pinion Company
First part of a three-part article stressing (in this part) the essentials of testing for machine accuracy and outlining procedures for sampling and testing of filling equipment.

60 Do you know enough about your product to choose the right lining for its container?
Looking at typical "problem" products and "answer" linings best suited to them—along with a general review of types of linings available for steel shipping containers.

65 Look at other factors, too, when choosing a lining
Urging careful attention to dispensing of product, pouring, corrosivity, as well as details of filling, clean plant conditions, and choice of gasket.

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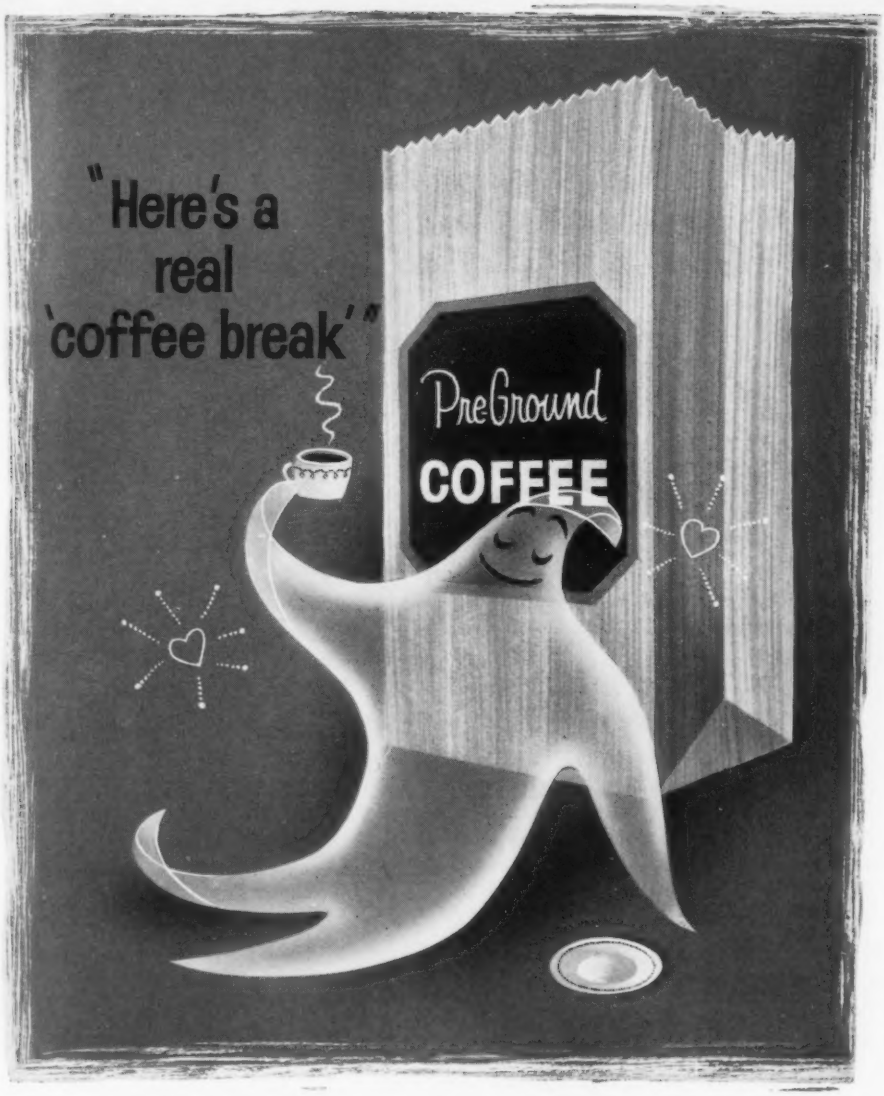
Reader Service Card inside back cover

Our December 1958 issue will carry a cumulative editorial index for the year listing our feature articles by subject, author, and other headings.



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BY

GOOD YEAR

Pliofilm, a rubber hydrochloride—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

A note from the Publisher

The man on the street and the newspaper columnists seem to agree we are well on our way to a higher level of business, and that because of government fiscal policies and the annual wage increases built into union contracts, prices will keep on going up indefinitely. The latter, however, is not necessarily so.

While the billions of dollars we are spending abroad will create new markets, they also will create new competition. As foreign countries become more industrialized, they will compete first with us in foreign markets and then eventually at home. They no longer will be manufacturing and packaging under the old craft system, but will be mechanized with a considerably lower labor cost than we have, and I do not believe tariffs can equalize wage differentials completely, or immediately. This may mean that American manufacturers will find domestic sales prices set by foreign costs. Furthermore, with improvement in transportation we may find ourselves competing with foreign products that are not competitive today. Consequently, there will be American companies who will find themselves unable to compete in the domestic market because they have not kept their manufacturing and packaging operations modernized.

The earnings of many companies will skyrocket in the next year or so because they have used the last year to cut the fat out of their organizations, bought faster packaging machinery, and so on. On the other hand, there will be many who will find that their competitive position a year from now is worse than it was two years ago because at the first sign of a business slow-down they stopped all modernization plans. For instance, manufacturers of packaging machinery have told me some of their equipment is still being used after 25 or more years. This is quite a testimonial to the quality of the machinery, but it is not testimonial to the far-sightedness of the user. The user of obsolete machinery certainly does not have the capital outlay that the buyer of new packaging machinery has, but his unit costs gradually go up and he has either to reduce dividends or pay earnings out of capital. Ultimately he will find himself not only no longer able to compete efficiency-wise, but will lack the capital necessary to buy the packaging machinery he needs.

The company who will be successful tomorrow, regardless of its size today, will be the one who is continually on the search for new and better packaging machinery and packaging methods, and for packages with better performance characteristics, and when found, will make the necessary investment to acquire them.

One of the reasons that leaders *are* leaders is because they do follow such a policy, and if the smaller companies are to survive they will have to pursue such a policy, too.

Angus J. Ray

Publisher

PACKAGE engineering®

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Package Engineering is published monthly by Angus J. Ray Publishing Co., 185 North Wabash Avenue, Chicago 1, Illinois. Angus J. Ray, president; R. B. Holmgren and I. F Megargee, vice presidents; James G. Culbertson, secretary and Ethyl K. Ray, treasurer. Please address articles for publication and correspondence regarding the editorial content to the editor. Statements and opinions expressed in articles and editorials are those of the respective authors, for which Package Engineering assumes no responsibility.

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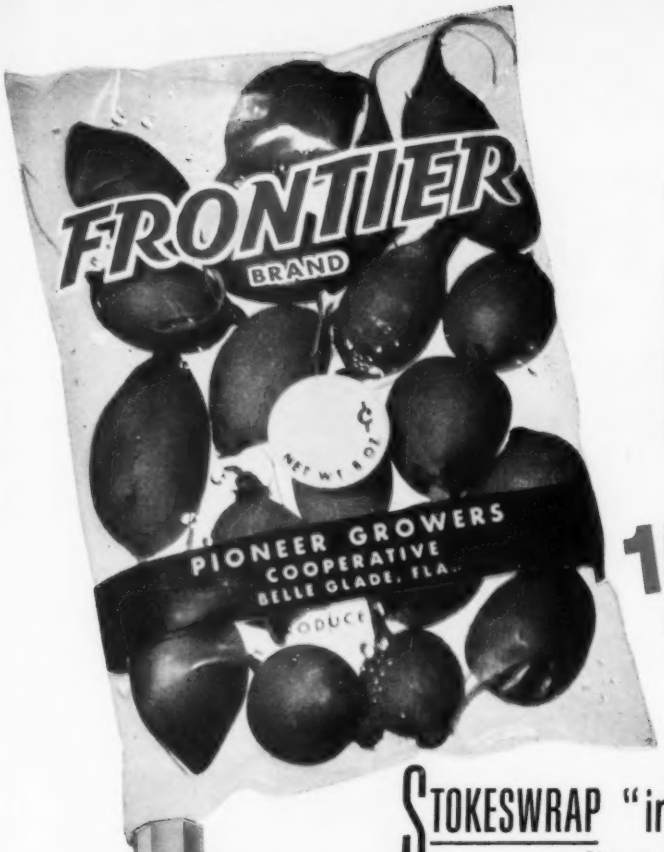
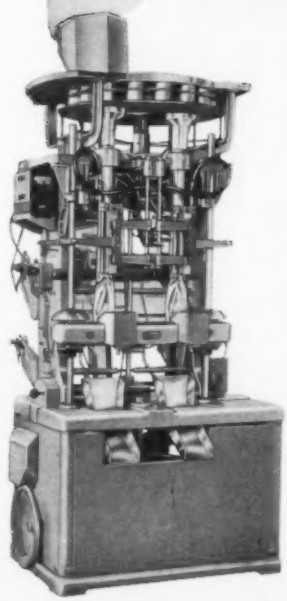


this polyethylene package is made with 15% LESS film!



STOKESWRAP "impulse seal" eliminates tabs, cuts film costs

Every seventh package at no cost! That, in effect, is what Pioneer Growers Cooperative of Belle Glade, Florida, has achieved with STOKESWRAP "impulse sealing" to package its famous brand of radishes.

With conventional sealing methods, each package required an additional inch of film in the form of tabs or ears. With STOKESWRAP impulse sealing, however, the package is cut off at the seal, eliminating the tabs and saving up to 15% in film length required. Electric eye control assures positive registration of the printed web. Positive sealing and cutoff are completed quickly in one automatic operation at high speed. The web is held in constant tension with no reversing, for smooth trouble-free operation.

"Due to the nature of this sealing and cut-off device, we can safely say we are saving nearly 15% in film," reports Mr. F. C. Dooley of Pioneer Growers.

Made from 1.25 mil polyethylene web 11⅛" wide, the 8-ounce package above measures 5¼" x 7¾". Elimination of conventional ears saves 1-inch of film length per package. STOKESWRAP with its wide selection of feeds — pocket, auger, tablet counting, net-weight scale and special mechanisms — is ideally suited to polyethylene packaging a great variety of products.

For complete details on how "impulse sealing" can cut your packaging costs, write to:

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Letters to PACKAGE engineering

Re: Quality control

Gentlemen:

Your article, "Quality Control of Container Components," in the August issue is a most thorough one which offers many useful suggestions that we could incorporate into our own quality control of packaging materials.

We would appreciate receiving a copy of this article.

F. N. Kisbany
American Tape Company
Port Huron, Michigan

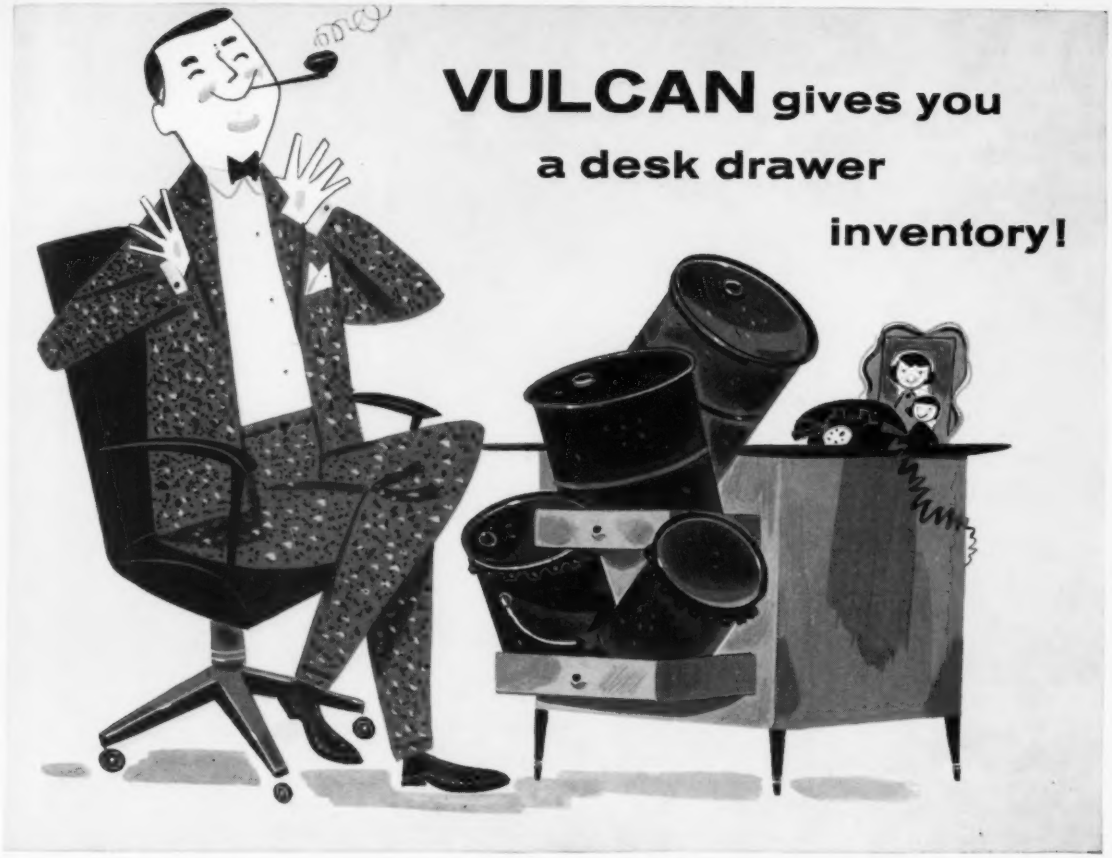
We appreciate your interest in quality control — and in our article. The copy you want has been mailed to you with our compliments. As long as our supply lasts, we are glad to send any reader free an individual copy of any article. All you need to do is ask for the article on your company letterhead, directing your request to our Reader Service Department, at our Chicago office.

Re: Professional standards

Gentlemen:

Your idea of setting proper standard for the accrediting of those who seek to use the term "packaging engineer" seems to be a good one. However, I can foresee many problems in attempting to set up this accreditation under the sponsorship of a single organization.

Any program of accreditation would have to cover at least the graphic arts, the plastic industry, metal working, machinery, and materials handling. At the same time there are those in the packaging industry who might properly be called engineers, whose responsibilities and interests are very concentrated. This is true particularly of those who are part of a large organization or whose experience has



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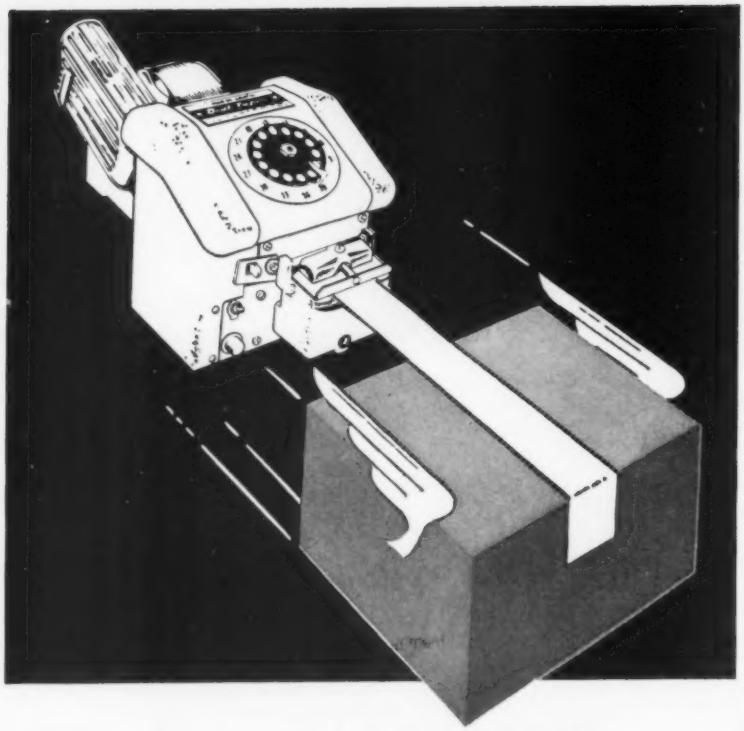
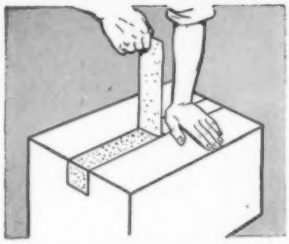
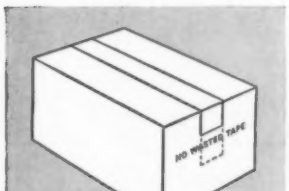




TAPE STICKS TIGHT—Make the tear test. Try to pull off tape applied from a Marsh Dial-Taper. Carton tears first, proving that the seal is stronger than the board.



NO WASTED TAPE—Any tape that overlaps end of carton more than 3" is wasted. Marsh Dial-Taper measures exact tape length you need, saves up to 1 tape roll in 5.

T-30

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been limited to a single industry or application. Here again we find specialists in chemistry, inks, adhesives, papers, plastics, foils, waxes, merchandising, and design.

The fact that there are so many ramifications does not necessarily mean that the problem is an insurmountable one and I am certain that with the proper guidance, professional standards, such as those set by TAPPI or other professional groups, can be achieved. Certainly the efforts of such groups as the Packaging Institute are a step in the right direction.

N. H. Abrams
Director of Engineering & Development
Bagcraft Corp. of America
Chicago

Gentlemen:

Your Note from the Publisher in the September issue in which you say "I think there is little in common between packaging men and materials handling men," I believe you should enlarge upon in another note, at some time.

In actual practice, I believe you will find that generally there is bound to be considerable necessary overlapping and actual necessary assumption of responsibilities by both the packaging engineer and the materials handling engineer in one another's scope of activities. This encroachment should not all be harmful in order to give management the best cost cutting results and improvements in any particular problem, where both types of engineers are on the payroll of one organization, or even where both types of professional service are sought outside of an organization at the same time. The mere fact that they generally have to work together on a particular problem for management does make them have a great deal in common. Their professional preparation and later extension studies generally give them sufficient knowledge of both phases so that they can function as one or the other type of engineer in an organization that is not able to maintain

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the services of two separate specialists in these fields.

Under any circumstances, the individual should maintain and use his professional title covering the branch of engineering he was specifically trained for, even though the service he performs for management may cross over into other branches of engineering or professional status.

Harris M. Murray
Materials Handling Engineer
Berkshire Hathaway, Inc.
New Bedford, Mass.

Gentlemen:

I personally agree with the thoughts which are expressed in the above editorial.

K. F. Vasiliou
Director
Package Research Laboratory
Rockaway, N. J.

Mr. Abrams' observation that a large organization begets considerable specialization and Mr. Murray's suggestion that engineers must tackle projects outside their particular specialties both indicate a common problem: This is the importance of a broad base of professional recognition. Presumably one could specialize in a wide variety of concentrated activities and still carry a professional recognition common to each of these specialties.

Many experts in engineering think that there is a proliferation of engineering specialization and that basic engineering education should concentrate on the basic sciences. Others go a step further and urge that specialized preparation for such functions as package engineering be graduate study.

But all this does not help the man who is a practicing package engineer in fact if not in name. The issue today is to establish a base of professional recognition for him and this raises the difficult, but not insurmountable, problem of balancing education, experience, and job responsibility.

Important point is that we keep moving in the right direction.

Packaging team at Caterpillar Tractor Co.

A manufacturer of tractors, graders, diesel engines and earthmoving equipment has his own specialized and intricate packaging problems. At Caterpillar, Parts Planning, Sales Promotion and Purchasing Departments jointly determine packaging for thousands of separate parts. Objectives: protection; convenience; economy; merchandising; compact stocking; rapid, dependable identification.

Federal Paper Board has worked closely with Caterpillar in developing and manufacturing its folding box packaging, as it has with many other makers of industrial products. If you sell original equipment, materials or component parts, this experience can help you. A Federal man will be glad to call for an exploratory talk.

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The PULSE / of packaging

Trends to watch:

Glass Container Manufacturers Institute says its package research laboratory at Michigan State University, East Lansing, Mich., is making "split-loaded" boxcar studies to compare interior packing materials. A split-loaded car has one side loaded with complete packages equipped with one style of interior packing while packages loaded on the other side of the car use a different style of packing. These test-track studies substantiate conbur testing, GCMI says . . . **Modernage Hosiery Mills, Div. of Phoenix Hosiery Co.**, South Pottstown, Pa., reports big sales hikes for its nylon hosiery in key-opening metal cans. Modernage says its cans protect hosiery from light and damage, assure fresh contents, and fit "traditional" supermarket buying habits . . . **American Can Co.** says its model automated dairy filling line has a 14,000-qt/hour capacity, can turn out filled milk cartons twice as fast as any current dairy operation. Once an operator tilts a carton carrier bag into position, the rest is automatic, the machinery takes it from there . . . Noting that predicted sales of urethane foam are 45,000,000 lbs. this year, **Mobay Chemical Co.** predicts a 100,000,000-lb. market in two years. It credits the "extreme adaptability" of urethane foam for this rise . . . **The Dow Chemical Co.** reports development of an expandable polystyrene bead with self-extinguishing characteristics. Molders use no additives with self-extinguishing materials, can use steam prefoamers to foam the material in place.

More expansion for packaging:

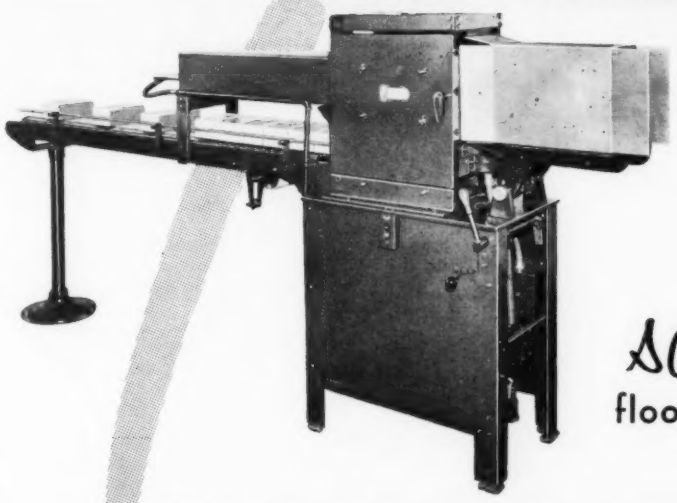
H. J. Heinz Co. now has an eight-story glass and aluminum research center at Pittsburgh. Packaging, along with sterilization, product improvement, food technology, recipe modification, and a pilot plant operation, occupy the new quarters. Forerunner of Heinz's new research center was a small food chemistry department set up 53 years ago, at that time a pioneering "first" . . . **Rexall Drug Co.** took another step in developing its Chemo-Plastics Div. when it bought **Tupper Corp.**, Woonsocket, R. I., plastic products maker, for 175,000 shares of Rexall stock plus a "substantial" cash consideration. Its development program includes use of new polyolefin resins, along with polyethylene . . . Taking a look at the polyethylene film field, the **Du Pont Co.** plans to make polyethylene films. Its film department will build a laboratory and pilot plant at Du Pont's Sabine River works, Orange, Texas, its principal polyethylene resin facility. Du Pont's polychemicals department expects to keep on supplying polyethylene resin to the film industry . . . Purchase of **Basca Manufacturing Co.**, Indianapolis, gives **Standard Packaging Corp.** a line of aluminum foil, plastic, and paper-foil laminated closures. Standard will move Basca's manufacturing facilities to its closure division at Chicago and its Johnston Foil Div. at St. Louis . . . **Eastman Chemical Products, Inc.**, Kingsport, Tenn., now has a pilot plant operation producing polypropylene at Longview, Texas . . . **Federal Paper Board Co., Inc.**, has a new folding carton plant at Washington, Pa. . . . **Union Bag-Camp Paper Corp.** plans to acquire all the stock of **Universal Paper Bag Co.**, New Hope, Pa., maker of multiwall bags . . . **H. B. Fuller Co.** plans to build a new adhesive manufacturing plant in Fairfax, Kan., with over 14,000 sq. ft. of production and warehouse space. The new plant will open in February, 1959 . . . Reports indicate that **Adolph Gottscho, Inc.**, Hillside, N. J., imprinting and marking equipment maker, is "miniaturizing" its various models, incorporating built-in factory adjustments . . . **Food Machinery and Chemical Corp.'s** packaging machinery division (Stokes & Smith plant), Philadelphia, is now selling volumetric fillers and hopper feed conveyors made by **Frazier & Son**, Clifton, N. J. . . . The reported purchase of **Kordite Co.**, Macedon, N. Y., from **Textron American, Inc.**, for $10,000,000 by **U. S. Industrial Chemicals Co., Div. National Distillers & Chemical Corp.**, provides the latter a film extrusion outlet . . . Moving into a new plant, **Averil, Inc.**, Miami contract packager, expects still more growth due to its water and air transportation proximity to Latin American markets . . . **The Dow Chemical Co.** says its Japanese affiliate, **Asahi-Dow, Ltd.**, is building a new styrene monomer plant at Kawasaki to step up raw materials supplies for polystyrene production in Japan . . . **Crowell Carton Co., Div. St. Regis Paper Co.**, Marshall, Mich., finished a $625,000 expansion and new equipment program . . . Planning to coat paper, board, foil, and other material, **Plastic Coated Paper Corp.**, a new firm, is building its plant at Hicksville, L. I. . . . **Pneumatic Scale Corp., Ltd.**, announces manufacture of its machinery in England by **Vickers-Armstrong, Ltd.**, and sold by **Rockwell Pneumatic Scale, Ltd.**, London. This program includes manufacture and sale of machinery both for packaging and bottling line operations . . . **Olin Mathieson Chemical Corp.** plans a 119,000-sq. ft. corrugated container plant to be built at Kansas City, Kan., replacing Olin Mathieson's present Kansas City plant and quadrupling its current production levels . . . **Bemis Bro. Bag Co. Co.** is transferring its West Coast paper specialty department to Fullerton, Calif., moving it from Bemis' multiwall plant at Bloomington, Calif. . . . **Chisholm-Ryder Co. of Pennsylvania,** Hanover, Pa., has acquired the **International Filling Machine Corp.**, Petersburg, Va. It will move International's operation to Hanover, integrating it with its own . . . **Continental Can Co.** plans to double the production capacity of its **Hazel-Atlas Glass Div.'s** plant at Plainfield, Ill. It also will build a glass container research and development center at Plainfield. It is closing the older of two glass plants at Zanesville, Ohio, and an outmoded plant at Grafton, W. Va. . . . **Campbell Packaging Co.**, New York, has been formed to develop packages of boxboard, plastics, and paper . . . **St. Regis Paper Co.** announces the merger of its subsidiary, **The Gummed Products Co.**, into its own organization as a separate division of St. Regis. The new division will continue to produce and market its gummed and laminated products with its own organization . . . **River Raisin Paper Co.**, Monroe, Mich., purchased the 64,500-sq. ft. plant of **Lehigh, Inc.**, at Lancaster, Pa. River Raisin plans to make corrugated and solid fibre shipping containers, paperboard and beverage cases there . . . **Knox Glass Inc.**, has a new 105,000-sq. ft. plant at Dayville, Conn. Its production will range from 1-oz. medicinal bottles to 1-gal. chemical containers . . . **Aerosol Techniques, Inc.**, Bridgeport, Conn., reports developing a new aerosol pharmaceutical manufacturing division specializing in producing inhalation therapy aerosols, pressurized vitamins, antibiotics, among others . . . **Chippewa Plastics, Inc.**, has a new 42,000-sq. ft. plant in Chippewa Falls, Wis., for production of polyethylene film. Two of its three stories are buried below ground, permitting peak use of gravity flow . . . **Clinch-Tite Corp.**, West Hartford, Conn., has acquired the fabricating division of **Newell Lumber Co.**, Sandy Lake, Pa., to operate as a division of Clinch-Tite.

Packaging dollars and cents:

W. R. Grace & Co.'s net earnings for the first half of 1958 were $.85 per share, with sales and operating revenues of $220,248,000. Similar figures for the first half of 1957 were $1.77 and $228,997,000. Grace blames higher depreciation, interest, and start-up expenses connected with its growth pro-

SOLVED!
MORE production-LOWER cost..

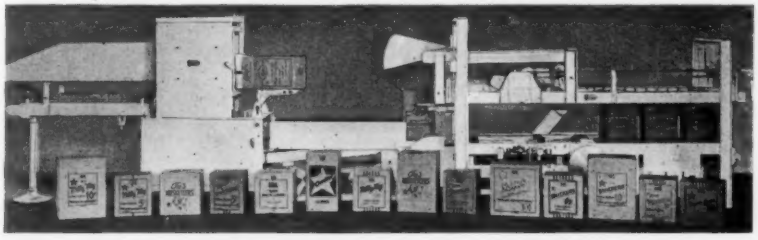
ABC SEMI-AUTOMATIC CASE PACKER



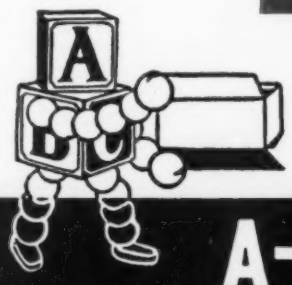
Saves floor space

This new "Job Rated" A B C Semi-Automatic Case Packer has been endorsed by the greatest names in the industrial field throughout the nation for its cost-cutting performance.
This streamlined trouble-free packer requires the minimum amount of floor space and is furnished with either a center right or left hand discharge.
Step up your production to a higher profit level with this precision engineered packer that can be adjusted to various packing arrangements and case sizes.

PACKER connected to JUNIOR CASE SEALER



The above Semi Automatic Packer and Junior Case Sealer is one of several now being installed in Mars Inc., new plant at Chicago, Ill., where geared up production is paramount.



WRITE TODAY FOR DETAILS — FLOOR PLANS and SPECS

A-B-C PACKAGING MACHINE CORP.
TARPON SPRINGS, FLORIDA

gram as significant factors for its drop in earnings . . . **Knox Glass, Inc.**, is increasing its authorized capital stock from $4,000,000 divided into 160,000 shares of $25.00 par value to $6,250,000 divided into one million shares of $6.25 par value. It plans to split each presently issued share of par value into four new shares of $6.25 par value . . . **The Dow Chemical Co.** announces a price of $55.75 a share on an issue of 175,000 shares of its common stock to be offered to its employees and those of subsidiaries and some associated companies. Eligible employees may subscribe up to 10 per cent of their annual wage or salary . . . Recent market quotations of Dow stock have ranged in the upper 60's.

What people are doing:

Kenneth A. Kaufmann is now supervisor of plastics market research and development at Amoco Chemicals Corp. He was previously Spencer Chemical Co.'s manager of plastics technical service . . . New director of Rexall Drug Co.'s Rexall Div.'s package development department, Los Angeles, is **Carl F. Schneider,** previously with White Laboratories, Inc., Kenilworth, N. J. . . . After 25 years with the company, **Mark K. Dresden** has resigned as president of A. H. Wirz, Inc., Chester, Pa. He has not yet announced his future plans. New president of Wirz is **Robert F. Cox,** previously its vice president in charge of production . . . On advice of doctors, **Charles E. Frohman** has resigned as president of West Virginia Pulp & Paper Co.'s Hinde & Dauch Div. He will continue as a director and as consultant to the company's executive committee. **L. Frank Thompson** is new manager of the H&D division. He was previously manager of West Virginia's kraft division, Charleston, S. C. . . . **Edward L. Kuhn** is now president and general manager of Consolidated Packaging Machinery Corp., succeeding **Edward G. Kuhn,** retired. New treasurer of Consolidated is **Leroy G. Wells . . . William H. Squire** is now sales development manager (a new post) of W. R. Grace & Co.'s Cryovac's Eastern division. **Richard H. Burnham** succeeds Mr. Squire as sales and promotion manager. Both will be at Simpsonville, S. C. . . . Milprint, Inc., Milwaukee, has named **Fred C. Jones** industry manager of foil products. He was previously Great Lakes regional sales manager for foil and containers of Kaiser Aluminum & Chemical Sales Inc., Cleveland . . . **John R. Cullinane** is now sales manager for all specialty paper plants of Bemis Bro. Bag Co., St. Louis. Mr. Cullinane was previously resident manager of Bemis' paper specialty plant, Crossett, Ark. **J. S. Heard** succeeds Mr. Cullinane there . . . **Kenneth M. Henry** is now associate director of research (a new position) of Owens-Illinois Glass Co. He was previously assistant director of research. **Robert T. Wallace,** chief of plastics development, is now assistant research director in charge of applied research in organics . . . **Russell B. Wilhelm** is now manager of processed food sales of Owens-Illinois' glass container div. Previously manager of dairy and instant products sales, Mr. Wilhelm succeeds **Kevin Hepp,** recently named manager of beverage industries sales . . . **Raymond W. Mann** and **Starr W. Stanyon** are now vice presidents of Hoague-Sprague Corp., Lynn, Mass., subsidiary of United Shoe Machinery Corp. Mr. Mann was previously plant manager and Mr. Stanyon director of research . . . **Lawrence Wilkinson,** previously executive vice president for glass and plastics operations, is now executive vice president for finance and administration of Continental Can Co. **Charles B. Stauffacher,** financial vice president, becomes executive vice president in charge of Continental's Robert Gair Paper Products group, succeeding **Norman F. Greenway,** who retires January 1. **William M. Cameron,** vice president of Continental's central metal div., is now executive vice president for glass and plastics operations. **E. L. Hazard,** director of staff to executive vice president of metal operations group is now vice president, succeeding Mr. Cameron. Now Continental's product divisions are organized in three major groups, each headed by an executive vice president. **Ruben L. Perin** continues as executive vice president of metal operations group . . . New vice president of Print-A-Tube Co., Rochelle Park, N. J., flexible packaging

NOW . . .

MULTIPLE PACKETER **MODEL II**

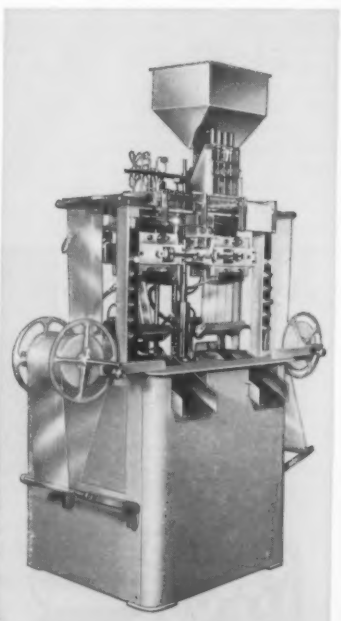
FOR BOTH LIQUIDS AND POWDERS

Completely Automatic production of up to 300 packets per minute. Interchangeable for ALL POWDER OPERATION — ALL LIQUID OPERATION — SIMULTANEOUS LIQUID AND POWDER OPERATION.

Produces up to 8 packets simultaneously. Packet sizes are variable from 1" x 1" to 8" x 8". The BFM Multiple Packeter forms, fills and heat seals — on all sides of the packet — from a continuous roll of heat-sealing material. A complete range of papers, foils, films and laminates can be handled, with electric eye registration of the printed material on both sides of the packet. Packets can be delivered in perforated strips *or* joined *or* individually.

POWDERS — Highly accurate volumetric or auger feeders for all free-flowing, granular and hygroscopic powders. Two different powders can be inserted into each packet. Hoppers can be divided for mixed filling.

LIQUIDS — The Multiple Packeter handles all free-flowing, viscous and semi-viscous liquids. Reverse vacuum design prevents stringers and leakers. Moyno or piston pumps available.



MODEL II showing simultaneous liquid and powder operation

For complete details on the new BFM Multiple Packeter Model II, write to:

BROWN FILLING MACHINE COMPANY, INC.

Division of FRANKLIN RESEARCH CORPORATION

FITCHBURG, MASSACHUSETTS

NOV. 1958

Plastiatrics in packaging

DOW'S CLINICAL APPROACH TO HEALTHY PLASTICS APPLICATION

DOW

COMPARISON TESTS PROVE SUPERIORITY OF BOTTLE CAPS INJECTION MOLDED OF STYRON

WORTHWHILE ADVANTAGES EVIDENT IN PERFORMANCE, STYLING, ECONOMY

Results of recent Dow Plastics Technical Service experiments with injection molded bottle caps offer greater performance possibilities for package engineers in this field. Findings noted here, and available in further detail from Dow, compare standard compression molded phenolic caps with caps injection molded of Styron® (Dow polystyrene).

Performance

With Styron, it is possible to blend general-purpose and impact grades in any proportions to obtain the exact toughness required for a specific application. In general, blends of medium impact Styron will require less material for a given cap than a phenolic cap of comparable toughness (Fig. 1). Styron plastic caps prove tougher, with greater torque to break (Fig. 3), which means less breakage during capping operation and shipping... they have a low creep factor which provides improved torque retention over longer periods . . . the low moisture absorption means improved dimensional stability . . . they're odor-free.

Styling

Color and design are unlimited with Styron. This Dow polystyrene plastic offers a complete color range . . . from white through light pastels to rich, deep tones. Styron plastic caps can be readily vacuum metalized. And injection molding offers fine detail and wide design possibilities.

Economy

Less Styron by weight is required for a cap of comparable toughness (Fig. 2). Low material costs and higher production rates of injection molding combine to provide caps of improved quality performance at prices often below those for phenolic caps.

The Styron family of plastic packaging materials can help you in many ways to solve your packaging problems and reduce costs at the same time. Get complete information from THE DOW CHEMICAL COMPANY, Plastics Packaging Service 1566N, Midland, Michigan.

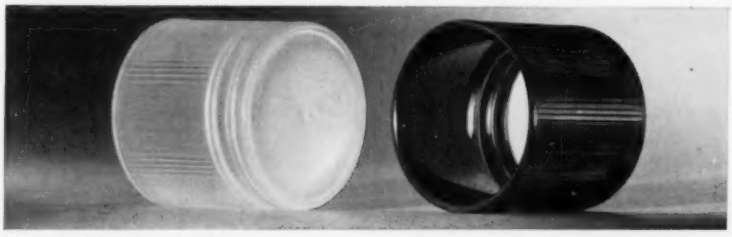
AMERICA'S FIRST FAMILY OF POLYSTYRENES

GENERAL PURPOSE
STYRON ®666
STYRON 689 (Easy Flow)

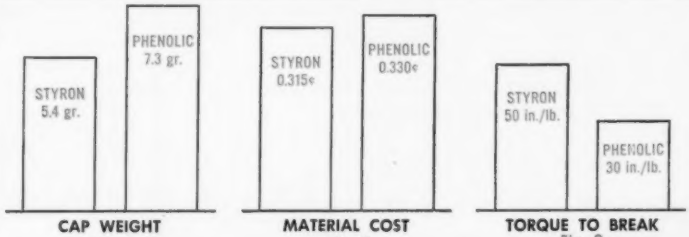
MEDIUM IMPACT
STYRON 330 (Easy Flow—Translucent)
STYRON 777

HIGH IMPACT
STYRON 475
STYRON 440 (Heat Resistant)
STYRON 440M (Easy Flow)
STYRON 480 (Extra-High Impact)

HEAT RESISTANT
STYRON 683
STYRON 700



Injection molded polystyrene bottle caps.



Comparison of polystyrene cap with phenolic cap showing improved performance of polystyrene cap which replaced phenolic cap.

YOU CAN DEPEND ON DOW

For more information circle No. 213 on Reader Service Card

New types of Patapar® give you a

REAL BARRIER

against penetration of

GREASE, FATS, OILS

As an inner protective barrier for multiwall bags . . . or wherever a grease-proof material is required, new types of Patapar Vegetable Parchment meet the most exacting requirements. These special grease-proof Patapars stop penetration. Oil will not spread on Patapar's surface. There is no grease "crawl".

Wet-strength, too

Permanent high wet-strength is another quality of the many different types of Patapar. And, made from pure cellulose, Patapar is odorless, non-toxic. It is furnished plain or colorfully printed.

If you would like to test Patapar for your product, write us telling your requirements. We'll send information and samples of the type we recommend for your purpose.

Patapar®
VEGETABLE PARCHMENT
HI-WET-STRENGTH · GREASE-RESISTING
HEADQUARTERS FOR VEGETABLE PARCHMENT SINCE 1885

OTHER PATERSON PRODUCTS
*PARCHKIN
*DURAPAK
*PATAX
*PATERSON
PATERSON PARCHMENT PAPER COMPANY
Bristol, Pennsylvania
Sales Offices: New York, Chicago
West Coast Plant: Sunnyvale, California

film is **Alexander B. Beal,** formerly production manager, printing department. **Justin Field,** previously general manager of Print-A-Tube's subsidiary, Skin-Pak Machinery Co., Inc., is now assistant to the president of Print-A-Tube. **Ralph I. Perault** is now general manager of Skin-Pak Machinery Co. He was previously sales manager of Brown Bag Filling Machine Co. . . . **Harold J. Michel,** general manager of American Viscose Corp.'s film division, is now vice president of the company. New manufacturing manager of its film division is **Dr. George W. Low, Jr.** He continues as manager of Avisco's Fredricksburg, Va., cellophane plant. **Edward L. Woolley** is now chief engineer of the film division, in addition to being plant engineer at Fredricksburg. **Charles R. Shaffer** assumes a newly created position in the film division's New York sales office. He was formerly head of the film division advertising at Philadelphia . . . New sales promotion manager (a new position) of Niagara Corrugated Container Co., div. of St. Regis Paper Co., is **Montague Mead.** He was previously with International Paper Co., container division, Geneva, N. Y. . . . **Daniel C. Geary,** formerly senior chemist in the aerosol section of Revlon, Inc., has joined Union Carbide Chemicals Co. aerosol technical service laboratory for Ucon propellants . . . **P. D. Larson** is now manager of Rhinelander Paper Co.'s recently established central sales district office, Chicago . . . Crown Cork & Seal Co., Inc., has named **Frederick E. Fauth** chief engineer of its machinery division, Baltimore . . . **James J. Sommers** is now manager of Container Corp. of America's corrugated container plant, Cleveland. He was previously comptroller of the company's Anderson, Ind., plant. New manager of Container's Malt avenue plant (Los Angeles) is **Louis M. Crandall.** He was previously assistant plant manager at Container's Ogden (Chicago) plant . . . The Dow Chemical Co. has named **Dr. William H. Schuette,** general manager of its Midland division, a vice president of the company . . . **G. J. Williams** succeeds **Donald L. Gibb** as sales manager of Dow's plastics department. Mr. Williams was previously assistant to Mr. Gibb who becomes a special consultant to the company . . . **Page Edmunds** is now assistant general manager of chemicals of W. R. Grace & Co.'s Davison Chemical Div. He was previously general sales manager for petroleum chemicals . . . New general sales manager of Kennedy Car Liner & Bag Co., Inc., Shelbyville, Ind., is **William N. Reimann.** He was previously general manager of its plastics division . . . **R. Kent Dailey** is now treasurer (a newly created position) of The Lord Baltimore Press. Olin Mathieson Chemical Corp. has named **Frederick B. Lee** director of its Washington, D. C., office . . . National Paper Boxes Inc., Kansas City, has named **James T. Sadler** executive vice president and **S. Orr Davidson, Jr.,** vice president. Mr. Sadler was previously vice president. *(End)*

THERMOGRIP® ADHESIVES

. . . Fast, economical bonding of packaging materials

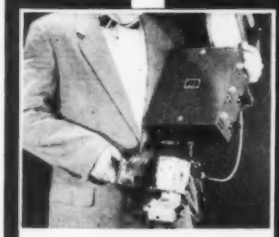
THERMOGRIP hot melt adhesive is different. It's solvent-free, 100% working adhesive. It comes in cord-like form on reels. THERMOGRIP is thermoplastic and sets instantly. It doesn't "dive" into porous materials. It bonds difficult-to-stick materials such as polyethylene, foils, special papers. It helps speed up operations with any materials. THERMOGRIP saves clean-up time. It's uniform, can't lump up, doesn't squeeze out. Machine speeds can be increased to maximum.

FOUR models of applicators are available depending upon the need. The applicators feed and melt just the right amount of adhesive and apply it to the material to be bonded. It can be applied in continuous lines and in dot, dash, or other patterns for bonding individual units.

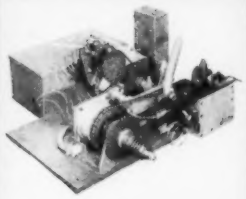
THERMOGRIP offers product improvements and production economies plus new convenience of use. Send us a sample of your product and description of your equipment, and we shall be glad to demonstrate how THERMOGRIP can help you.

On Your Machines

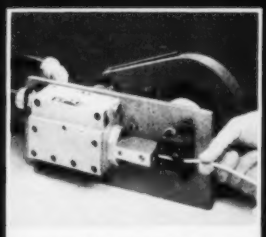
4 DIFFERENT APPLICATORS OFFER BROAD USE OF THERMOGRIP



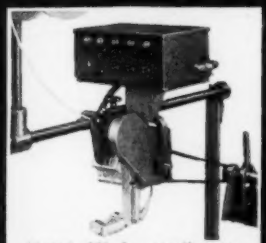
New model CN applies one or more continuous lines through a nozzle — up or down — on moving webs. Capacity up to 6000 feet of ¼ inch wide seam per hour.



Model AW is a heavy-duty transfer wheel applicator with capacity up to 35000 feet of ¼ inch wide seam per hour. Various adhesive patterns can be applied to individually passing items or blanks.



Model CW, transfer wheel type with capacity to 6000 feet of ¼ inch wide adhesive per hour. Applies various adhesive patterns to individually passing units. Small, compact, adaptable, it operates at any angle — even upside down.



Model AN for continuous seams. Capacities up to 35000 feet per hour based on ¼ inch wide band. Job designed nozzle application permits variety of seam combinations and locations.

EVERY APPLICATOR CUSTOMIZED TO YOUR OPERATION

United SHOE MACHINERY CORP.

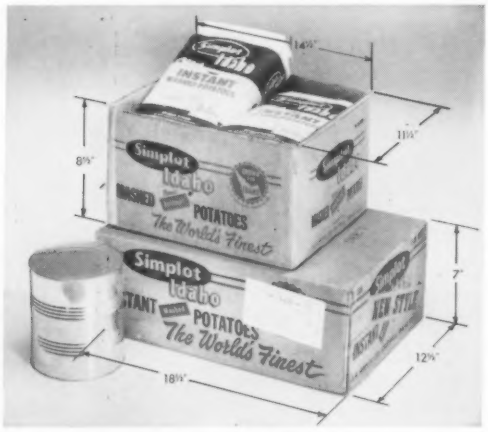
140 Federal Street, Boston, Massachusetts

Packaging is more than "Skin Deep"!

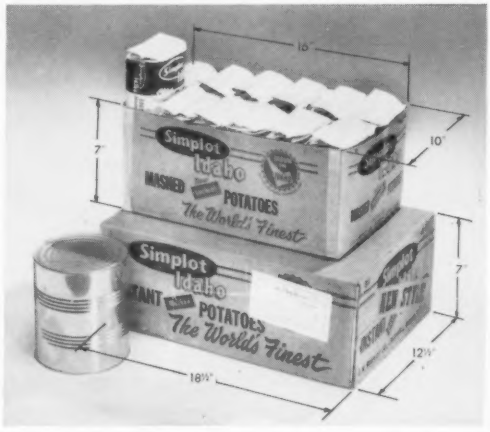
PACKAGING PROBLEM

The Simplot Company was packaging their Instant Mashed Potato granules in #10 tin cans. They were concerned with the package because some small restaurants were unable to use a complete can at one time (each can contained enough product for 150 servings). The cans were expensive, and their weight made shipping charges high.

Simplot working with Western-Waxide's Research and Development Laboratory went in search of a package that would provide the needed protection, convenience, and economy.



10# bags save 201 cu. in., carry 40 lbs. per case!



3# bags save 498 cu. in. per 36 lbs. product!

SOLUTION:

Western-Waxide's Research and Development Laboratory had previously developed a bag for a dried milk producer. Called the Crown Dri-Pak* bag, its construction is bleached kraft paper laminated to .00035" foil with polyethylene coating over the foil. Bag closure is achieved by heat sealing with standard equipment. It is strong, an excellent water-vapor barrier, very economical, and can be produced in a variety of sizes. It is also easy to reclose for temporary protection of unused portions.

Crown Dri-Pak bags filled with Simplot instant potato granules were placed in the "tropics room" of the San Leandro Laboratory, R. H. 90% and temperature 100°. Ninety days later, the sample showed *only ½% moisture gain*—and no trace of discoloration or flavor damage. These tests clearly indicated that the Crown Dri-Pak bag was the answer to this packaging problem.

Two bag sizes were adopted—3# and 10#—to provide maximum convenience to customers. Most small restaurants use the contents of the 3# bag (75 servings) at one time. If there are leftovers, the dead-folding properties of the foil allow the bag to be folded over snugly for further protection. Larger institutions find the 10# bag suits their daily needs.

The new package is economical: 3# bags, packed twelve to a shipping case, result in combined packaging and shipping savings of $17.80 per ton of product. The larger 10# bags, packed four to a case, reflect a savings of $28.70 per ton of product. In addition, the bag is easy to open, handle, and reclose; less storage space is required (see photos above) and empty bags are more easily disposed of than tin cans. And as a "bonus extra," Simplot now benefits from strong brand identification from each unit—for each bag is printed in red and blue on a sparkling white background.

This case history is another successful packaging application of an extremely hygroscopic product in Crown Dri-Pak Bags.

The personnel and services of Western-Waxide's Packaging Research and Development Laboratory can turn packaging problems into profits for you! Write or phone your nearest Western-Waxide office today.

*Dri-Pak is a trade mark of Crown Zellerbach Corporation.

CROWN ZELLERBACH **WESTERN-WAXIDE DIVISION**

Headquarters Office: 2101 Williams St., San Leandro, Calif. • Plants and Sales Service Offices in Principal Cities of the United States

Manufacturers and converters of plain and printed waxed paper • foil • foil laminates • polyethylene coated paper and polyfilm laminates • films • bags • pouches and other specialized flexible packaging materials

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Famous pharmaceutical maintains commanding position

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LISTERINE'S SUCCESS LIES IN CONSTANT UP-DATING OF PROMOTION AND PRODUCTION

• Pneumatic packaging equipment one example

High speed Pneumatic bottling line in operation at Lambert-Hudnut plant.

The promotional imagination and genius displayed in the fabulous success story of Listerine's ascent to a position of dominant leadership as a personal antiseptic has become one of the great legends of American business.

Listerine's marketing ingenuity and skill have been obvious. Less obvious, perhaps, has been the part that production methods and plant efficiency have played in making possible the maintenance of satisfactory cost and profit margins.

Part of Listerine's master plan has been constant modernization and unrelenting elimination of obsolescence. The new Lambert-Hudnut plant in Lititz, Pennsylvania, where Listerine is now produced, is an example. Here, where the most up-to-the-minute facilities prevail, Listerine operates a number of Pneumatic machines including a bottling line for the automatic cleaning, filling, capping and labeling of the three sizes of Listerine containers — three ounce, seven ounce and fourteen ounce.

This Pneumatic hook-up handles the tremendous Listerine daily production with impressive ease, and with a "lower cost per container" efficiency that has made Pneumatic equipment first choice of the leading producers in pharmaceuticals, foods, liquors, soaps, cosmetics and chemicals, to mention a few.

Early Listerine Advertisement

When you have packaging or bottling equipment on your mind, Pneumatic is the name to remember.

PNEUMATIC SCALE CORP., LTD., 77 Newport Ave., Quincy 71, Mass. *Also New York; Chicago; Dallas; San Francisco; Los Angeles; Seattle; Leeds, England.* Subsidiaries: *Delamere & Williams Company, Ltd., Toronto; Carbert Mfg. Co. Inc., Cambridge, Massachusetts.*

PNEUMATIC

Ahead with

GLASSINE

New...
another striking
example of
Glassine Protection

Here's news in protective packaging! For longer freshness, best flavor, and customer convenience, National Biscuit Company has adopted glassine innerwraps for the new Ritz cracker "Stack Pack." The newly designed carton with its revolutionary fractional inner packaging, contains three cylinders of Ritz crackers, each wrapped in waxed* wax-laminated glassine. Rhinelander Glassine papers are a part of this progressive development.

This functional glassine development was selected for the new "Stack Pack" because it is a most effective moisture barrier, provides breakage protection and recloses easily and positively. Versatile Rhinelander Glassine or Greaseproof is the economical answer for many packaging applications . . . Works smoothly on high speed packaging equipment.

Write for full information and samples, stating your particular application.

*Waxed and printed grades available through leading converters.

GLASSINE • GREASEPROOF •

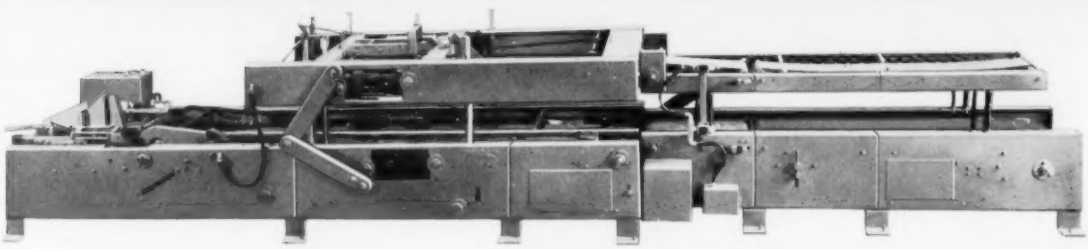
RHINELANDER

Rhinelander Paper Company • Rhinelander, Wis.

Subsidiary of St. Regis Paper Company

COST REDUCTION IS BUILT INTO THE REDESIGNED STANDARD-KNAPP GLUER & SEALER

Easily removable glue pots and rollers . . . identical glue pots and rollers for upper and lower application . . . no leakage of glue onto product . . . adjustable to a wide range of case sizes . . . speed up to 30 cases a minute . . . these are just some of the operational advantages of the redesigned Standard-Knapp Case Gluer & Sealer that will reduce your case closing costs. *Make sure you have complete specifications. Write for our bulletin.*



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MANUFACTURING COMPANY
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WAXED GLASSINE

Sales-Power Packaging begins with Lower-Cost WAXED GLASSINE

One sure way to sell today...
Use wraps of Waxed Glassine inside, Waxed Paper outside! Pre-sold protection helps make Your Brand a buying habit!

Flavor protection—That new-baked crispness and deliciousness arrives safe at the table, sealed in securely to assure consumer loyalty for Your Brand.

Freshness protection—Fights grease and moisture penetration to prolong fresh life of packaged products. Opens easily, recloses tightly, stays closed. Waxed Glassine holds *in* the freshness that holds *down* returns and lost sales, lifts profits *up*.

Billboards your brand—Your name stands out with definite billboard impact. Waxed Glassine sharpens colors, strengthens identification, insures selection. Builds impulse sales, sparks repeat sales with more on-the-spot shopper appeal. Rugged self-sealing wrapper handles easily on the machine, passes every shipping, store and home handling test.

Lower cost—Cuts initial wrapping expense sharply. Add lower cost and unfailing availability to Waxed Glassine's other proved advantages. Sum total: America's most preferred, most profitable packaging.

WAXED PAPER MERCHANDISING COUNCIL, INC.
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STate 2-8115

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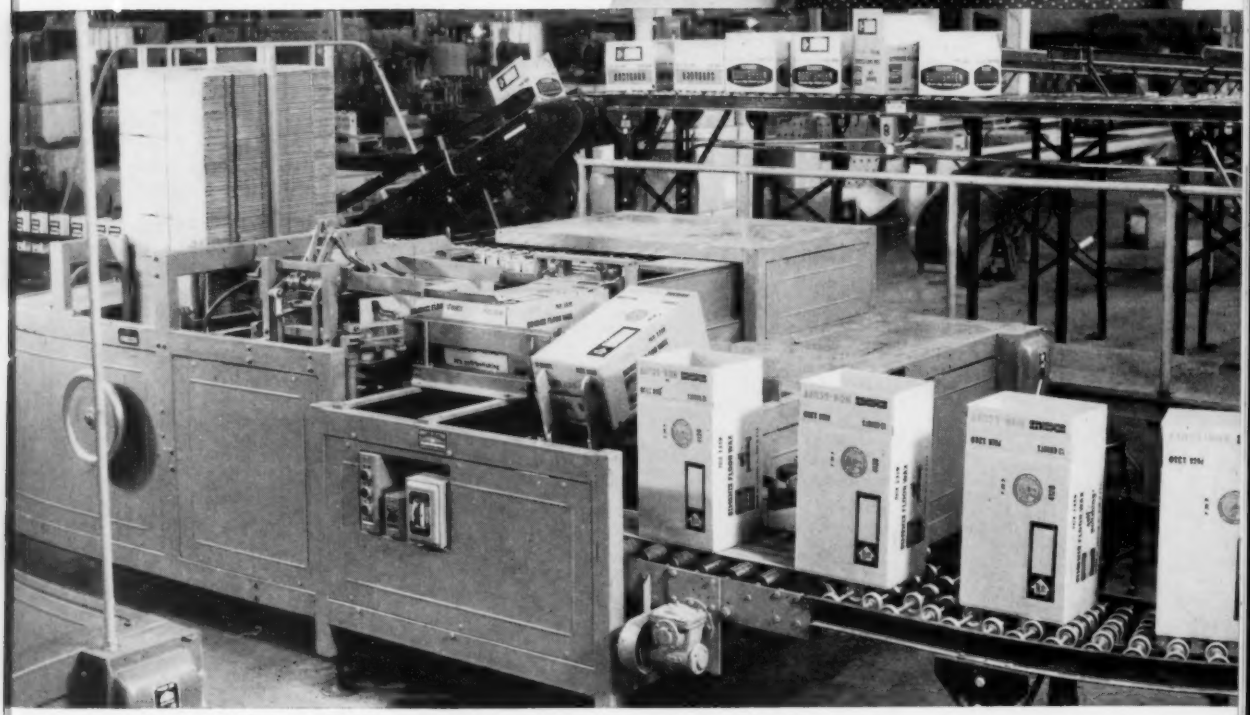
Simoniz
puts "protection"
in a can

Packomatic®
puts the cans in a case



Packomatic equipment feeds, forms, positions, loads, seals and imprints corrugated shipping containers automatically. However you ship—in multi-ply paper bags, or in corrugated shipping containers; whatever you "package"—a can, a carton, a box or a bale—there's a Packomatic machine designed to handle your shipping container requirements. Packomatic machines, geared to your production line, will feed, form, position, load, seal and imprint corrugated containers automatically—or do any of these operations singly as a complement to your existing packaging facilities. Let one of our sales engineers suggest the start of a long-range packaging program for your plant. Investigate the Packomatic method of cutting costs and boosting production. Call, write or wire today.

Fully-automatic Packomatic Case Former-Loader, part of a fully-automated production line at the Simoniz plant, Kankakee, Illinois. Other Packomatics on the Simoniz line include Case Sealers and Case Imprinters.

Begin to automate your packaging line with this high-speed, fully-automatic Case Sealer. Aligns loaded cases, positions flaps, glues, seals and discharges — and no operator needed! Available in wide range of sizes. Semi-automatic, too. Call or write for additional information.

J. L. FERGUSON CO. Joliet 1, Illinois

PACKOMATICS include the Bale Sealer • Case Sealers • Opener-Loaders • Case Imprinters • Telescoping Volumetric Fillers • Packer-Gluers • Semi-automatic or fully-automatic.

Keep 'em selling . . . guard their flavor with Saran Resin F220

Even a thin coating of Saran Resin F220 on your packaging film keeps flavor and freshness locked inside . . . and keeps customers coming back for more.

Saran Resin F220 reduces gas permeability and moisture vapor transmission to a minimum . . . increases resistance to greases, oils, acids and many organic liquids and vapors. Here is the coating that gives packaging materials a heaping measure of new protective qualities.

Minimum coating gives maximum protection on polyethylene, cellophane, polyester film, aluminum foil. Saran Resin F220 is soluble in acetone . . . releases solvent readily . . . and is adaptable to a wide variety of coating operations.

Whether you manufacture or use packaging film, investigate saran resins and take advantage of these sales-making properties. Write to your nearest sales office of THE DOW CHEMICAL COMPANY, Midland, Mich., Coatings Sales Dept. 2257A-1.

YOU CAN DEPEND ON DOW

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GAYLORD POINTS OUT
MANY WAYS YOU CAN SAVE IN PACKAGING

Gaylord uses a sharp pencil to survey your *total* packaging operation—checks those hidden costs that are frequently more important than the price of the box.

If you demand increased production, improved protection and important savings in corrugated packaging . . . call in your G-man. He'll help you erase any packaging errors, leave an indelible mark on the credit side of the ledger.

GAYLORD
CONTAINER CORPORATION

Gaylord Boxes

HEADQUARTERS, ST. LOUIS
PLANTS COAST TO COAST

DIVISION OF **Crown Zellerbach Corporation**

LESS SPILLAGE!

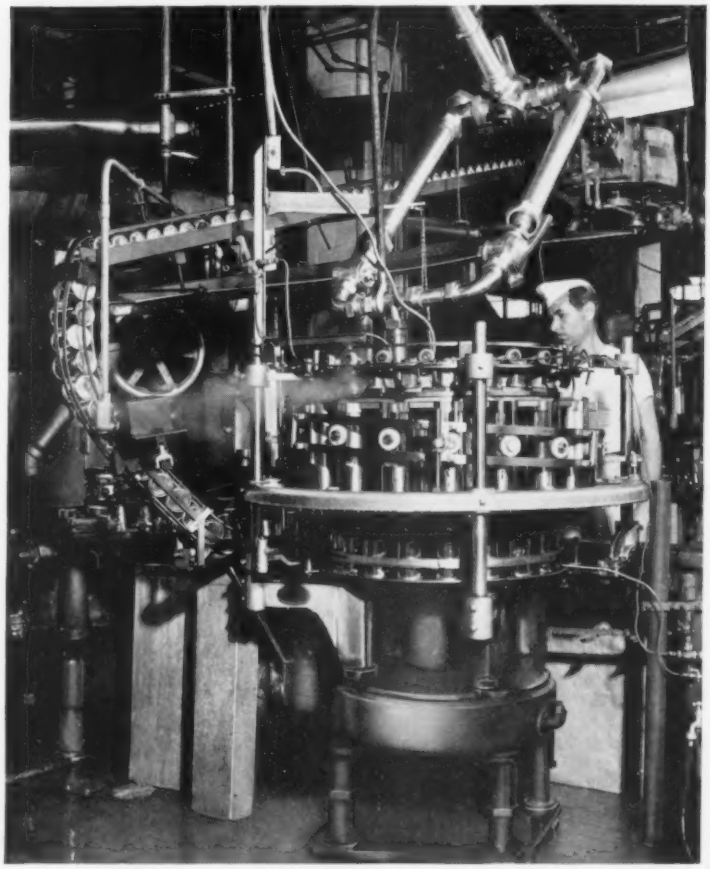
Hershey packs chocolate syrup with a *Votator*® FILLER

TO HELP adhere to its strict standards of plant cleanliness and efficiency, Hershey Chocolate Corporation recently selected a VOTATOR* Piston Type Filler for packaging of chocolate syrup. Results reported: Fill is more uniform; spillage has been reduced; higher standards and speeds are maintained on a continuous filling schedule.

In deciding on the VOTATOR Filler, Hershey's Laboratory, Engineering and Production Departments studied all types carefully and chose it because, "We thought the VOTATOR Filler would do the best job for us." It is now doing just that.

Why not investigate VOTATOR Fillers for *your* product. See how it can boost filling speed, improve accuracy of fill, reduce spillage. Write for Bulletin PED 257.

*VOTATOR and THERMEX Reg. U.S. Pat. Off.



Hershey packs chocolate syrup in 16-ounce cans at a rate of 300 cpm—18,000 cph with this 18-station VOTATOR *Piston Type Filler.*

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CHEMETRON

A new polyester film

It comes in two forms, unoriented and oriented. Both behave differently, have many unlike characteristics. These make us view them as completely different materials.

By Paul J. Vaughan,
Manager, Chemical Products Development, Chemical Products Development Division, The Goodyear Tire and Rubber Company, Akron

Looking for a fiber from which to make an improved cord for tires can yield some interesting results. Such was the case many years ago when our research chemists turned to polyesters for this purpose. Many resins were produced which appeared to have some of the desired qualities.

After much trial and evaluation of some of the more promising substances, we reached the conclusion that some of these resins would make very interesting films. One resultant material warranted thorough investigation. This film is a polyester type manufactured by the extrusion process. It is not plasticized. It possesses good abrasion and scratch resistance, strength, optical clarity, and very good aging qualities, among other characteristics.

Two types—use differently. Currently available in two forms, Videne A and Videne TC, both are made from the same basic resin. However, they are two separate animals in that they possess many different characteristics. Each is used in a completely different manner from the other. Thus, it is necessary that one view them as two entirely different materials.

TYPE A

This type is supplied as an amorphous, unoriented film. Because of its brittle nature, it appears that uses for the film in the unsupported state will be limited in packaging fields. Thus, it alone is not suitable in packaging as a direct overwrap, for instance, for cartons. It is compatible with many other materials, however, and when used in conjunction with them, forms laminates with commercial strength characteristics.

Has "built-in" adhesive. It possesses a novel characteristic in its ability to be laminated to many other materials without the use of adhesives. Figuratively speaking, it has its own "built-in" adhesive. Heat and pressure are the only requirements to form a permanent bond by the conventional full-gauge or stretch-laminating process to many plain materials.

Some of the materials to which type A can be permanently adhered in this manner are aluminum foil and other metals, paper, paperboard, rigid vinyls, and others with non-migratory plasticizers, textiles, glass, wood, and cellulosic film. Exceptions to this form of lamination of type A are polyethylene, polystyrene, saran, Teflon, silicones, and other films containing migratory plasticizers. However, it can be laminated in the conventional manner to some of these excepted materials through the use of adhesives.

Type A is supplied in gauges ranging from 0.002 in. to 0.0075 in. These thicknesses are required in laminations for many heavy-duty applications. However, much lighter gauges are suitable in laminates for many packaging applications. To supply thinner gauges, as low as 0.0002 in., would require extensive processing equipment which would be impractical from the standpoint of economy. Thus, the process of thinning the heavier material is combined with the techniques of laminating to result in a single operation. This process is termed "stretch-laminating."

Stretch-Laminating

Basically this process consists of two stages, the first being thinning, the second, laminating. Referring to Fig. 1, the film is pulled off the feed roll *F* by the bite of roll *X* and the governor roll *G*. The latter roll is powered, but its surface

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speed can be varied since it governs the feed rate of the film. This feed rate is determined by the stretch ratio desired. To insure good gauge control, the governor roll is maintained at a pre-heating temperature of 135°F. or a little less.

Use releasing agent. Traveling about two-thirds the circumference of the governor roll, the material then passes to roll *H*. It is heated by radiation from roll *H* and thins down prior to contacting roll *H*. The temperature of this roll may range from 220° to 300°F. Incidentally, the surface of roll *H* must be treated with a releasing agent such as Teflon or a silicone to prevent the type A material from being laminated to it. The film is carried around roll *H* by the pull created by the bite of rolls *H* and *Y*.

Thinning stage. Geared together and powered, rolls *H* and *Y* turn at a constant rate of speed. The difference in rate of surface speed between the two sets of rolls (*X* and *G*, and *H* and *Y*) determines the amount of stretch. For instance, should the governor roll be operated at a surface speed one-fifth that of roll *H*, the film would be stretched five times its original length.

At the same time, the gauge will be reduced to one-fifth of the original thickness since the width of the film web remains practically the same during the stretching process. Thus, if 0.002-in. material is run through the process operating at this ratio of speed, the resulting film will be 0.0004 in. thick.

Laminating stage. The laminating stage occurs at the bite of rolls *H* and *Y*. The substrate material is pulled from the feed roll *S* and joined to the hot, already-thinned type A just as the two webs enter the bite. The necessary pressure to form a permanent bond is supplied by this bite. This pressure may range from 5 to 50 lb/sq. in., depending upon the substrate material.

The finished laminate passes around *Y* and subsequently to the take-up roll *T*. It may be necessary to pre-heat the substrate material in the pre-heat oven *P*. Otherwise, if not pre-heated, the substrate may cool the polyester film to such a degree as to prevent a good bond.

Does not orient film. Due to the physical and chemical nature of type A, this process of stretch-laminating does not orient the material if a minimum temperature of 220° F. is maintained on roll *H*. Instead, a molecular slippage occurs; that is, the molecules are thinned out over a wider area rather than being aligned as is the case in true orientation. If the temperature of roll *H* were controlled at approximately 185°F., orientation would result.

Table I
Properties of Videne A

Property	Typical Value*
PHYSICAL:	
Area Factor	20,120 sq. in/lb/0.001 in.
Density	1.34 gm/cc.
Tensile Strength (0.003 in. thick)	8,500 lb/sq. in.
Break Elongation @ 77°F. (0.003 in. thick)	4%
Impact Strength (0.005 in. thick)	
@ 77°F.	11 in.
@ 8°F.	8 in.
Burst Strength (0.005 in. thick)	60 lb/sq. in.
Tear Strength (0.005 in. thick)	8 gm/0.001 in.
Fold life (0.003 in. thick) (1,050 gm. load)	
Clear Finish	350 cycles
Satin Finish	350 cycles
Abrasion (0.005 in. thick) (1,000 gm. load)	0.0030 gm/1,000 cycles
Hardness (0.005 in. thick)	80 scale
Water Vapor Transmission	2.25 gm/100 sq. in/24 hr/0.001 in.
Gas Transmission	
Air	4.0 cc/100 sq. in/24 hr/0.001 in.
Carbon Dioxide	3.25 cc/100 sq. in/24 hr/0.001 in.
Oxygen	5.5 cc/100 sq. in/24 hr/0.001 in.
Humidity Coefficient of Linear Expansion (avg.)	11.5×10^{-6} in/in/% R.H.
CHEMICAL:	
Fungus Resistance	Inert
Fadeometer	No discoloration after 500 hr.
Weatherometer	No discoloration after 1,000 hr.
Salt Spray	No discoloration after 1,000 hr.
Copper Corrosion	Negligible
Absorption (24 hr. immersion @ 77°F.)	
Water	0.5%
Ethyl Alcohol	0.2%
SAE Oil	1.5%
Gasoline	0.1%
Carbon Tetrachloride	1.0%
Methyl Ethyl Ketone	2% (swells)
Diethyl Ether	3.5%
Benzene	6% (swells)
Chemical Resistance	Excellent for weak acids and bases
Aging	
Arizona Exposure	No discoloration after 19 mo.
Florida Exposure	No discoloration after 19 mo.
ELECTRICAL:	
Dielectric Strength (60 cycles, 25°C.)	4,500 volts/0.001 in.
Dielectric Constant (1 kilocycle, 25°C.)	3.88
Power Factor (1 kilocycle, 25°C.)	0.75%
Volume Resistivity (25°C.)	1.1×10^{13} ohm/cm.
THERMAL:	
Melting Point	350°F.
Softening Point	180°F.
Service Temperature	—40° to 200°F.
Shrinkage @ 200°F.	less than 1.5%
Coefficient of Expansion	21×10^{-6} in/in/°F.
Conductivity Coefficient	3.42×10^{-4} cal/sec/sq.cm/cm/°C.
Olson Flow (1,000 lb/sq. in. @ 300°F.)	1.5/10 in/sec.
OPTICAL:	
Index of Refraction	1.60 n_D^{25}
Finish (Gardner 60° reflectance)	
Gloss	90-95
Satin	35-45

*Values represent typical or average test data and not minimum values.

Functional Properties of Type A

In discussing the various properties of type A, the values given represent typical or average test data and not minimum values. (See

Table I) Type A is essentially a transparent, water-white film. It possesses good clarity and exhibits considerable gloss and sparkle, due in part to its high refractive index of 1.70 $n\frac{25}{D}$. These properties are very desirable in most any packaging application. It is available in two finishes: Gloss, with a Gardner 60° reflectance reading of 90-95, and satin, with a Gardner reading of 35-45.

Is surfacing material. The break elongation and fold life of type A are very poor. Tensile strength and tear strength are low compared to other plastic films. However, these are some of the properties which do not adversely affect its use as a laminating and surfacing material. Of particular importance are the film's very good burst strength (60 lb/sq. in.), hardness (80 scale), and abrasion resistance (0.0030 gm/1,000 cycles).

Because of these latter three properties, the material, when laminated to another substance, provides good abrasion and scratch resistance. For instance, experimentally, type A has been used as a surfacing material to improve the abrasion resistance of aluminum foil whereby it has provided the metal with a great amount of additional utility.

Permeability. The water vapor transmission rate is 2.25 gm/100 sq. in/24 hr/0.001 in. From the standpoint of gas permeability, it is a good barrier. Average transmission rates of oxygen, carbon dioxide, and air are relatively low. This indicates that a type A lamination might be used for a package where one or more of these gases is detrimental to the product.

Good grease and oil resistance is exhibited by this material. Thus, a laminate containing type A suggests its utility for packaging such products as butter, lard, and other oily substances.

Unlike most films, it possesses good outdoor aging characteristics. From tests run to date, no discoloration has occurred due to outdoor exposure. Laminated to other materials, it has imparted this feature to them, improving their outdoor aging qualities.

Table II

Properties of Videne TC

Property	Typical Value*
PHYSICAL:	
Thickness (avg.)	0.0004 in.
Area Factor (0.0004 in. thick)	55,000 sq. in/lb.
Tensile Strength (@ 77°F.)	
Longitudinal	9,713 lb/sq. in.
Transverse	10,416 lb/sq. in.
Break Elongation (@ 77°F.)	
Longitudinal	15%
Transverse	20%
Drop Height (falling ball impact test)	
@ 77°F.	63 in.
@ 37°F.	49 in.
@ 0°F.	37 in.
Tear Strength (@ 77°F.)	
Longitudinal	33.0 gm/0.001 in.
Transverse	33.0 gm/0.001 in.
Water Vapor Transmission	3.07 gm/100 sq.in/24 hr.
Gas Transmission (oxygen)	4.47 cc/100 sq. in/24 hr.
THERMAL:	
Initial Shrink Temperature	147° F. (see Fig. 2)
Sealing Temperature	175° to 225°F.
OPTICAL:	
Light Transmission (visible range)	80 to 85% (see Fig. 3)
Haze	5 to 6%

*Values represent typical or average test data and not minimum design values.

Thermal properties. Dimensionally stable through a wide range of temperatures and humidities, shrinkage is less than 1.5 per cent at 200° F. It softens at 180°F. and melts at 350°F. Its service temperature ranges from —40° to 200°F. Combined with another material such as aluminum foil, it can be autoclaved under standard au-

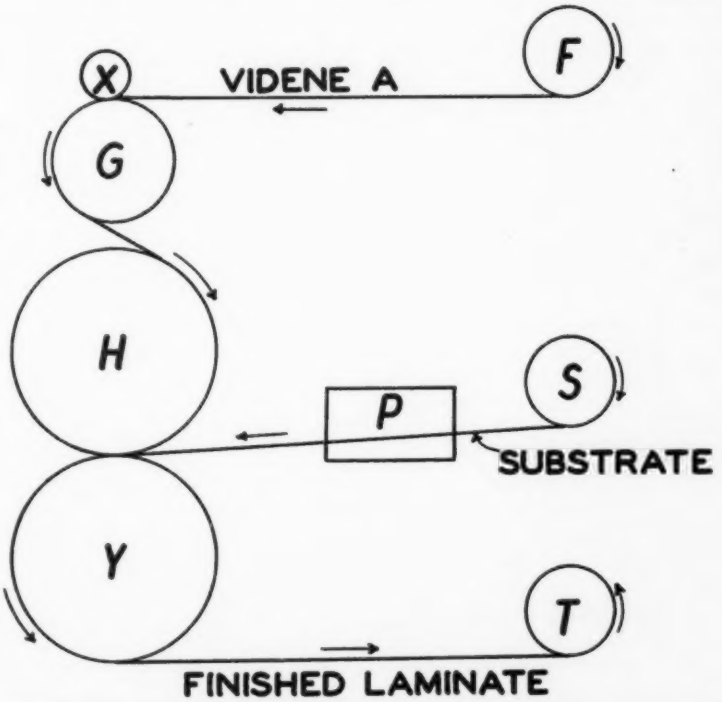

Fig. 1. Diagram of stretch-laminating equipment. Process consists of two stages: thinning and laminating; thus, these two techniques are combined into a single operation. Difference in rate of surface speed between rolls X and G, and rolls H and Y determines amount of stretch (or thinning). Laminating occurs at the bite of rolls H and Y.

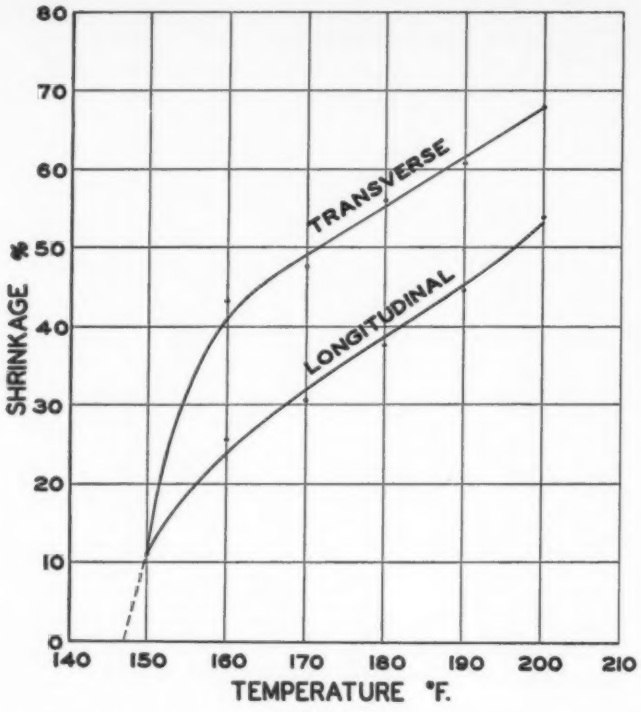

Fig. 2. Hot-water shrinkage of type TC. Film is stable toward heat up to 147°F. above which it will shrink at fairly rapid rate with increase in heat. Note difference in rate of shrink between transverse and longitudinal directions of material. Shrinking of film can be accomplished by hot air or hot water.

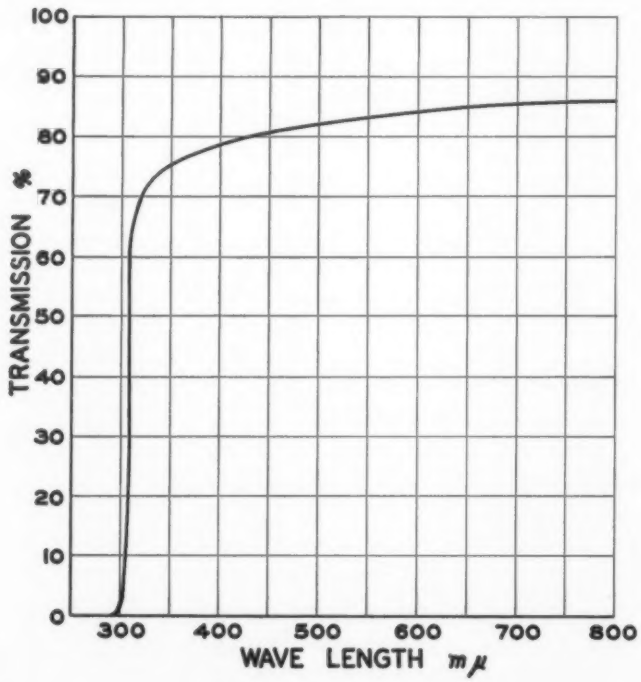

Fig. 3. Per cent transmission of light through type TC vs wave length.

toclave pressures and temperatures — as high as 10 lb/sq. in. steam pressure, approximately 240°F. It will not delaminate, break down, or adhere to the product within the package. This suggests that a type A lamination can be used for a cook-in package.

Such a laminate can be embossed at temperatures ranging from 250° to 300°F. It is necessary, however, that the material be cooled adequately to allow for reasonable set. Conventional forming equipment can be used to form type A laminations into various shapes under the same temperature range.

They can be vacuum-drawn to the limits of the substrate. Here again, in these two operations, release agents must be used on the plates, cylinders, and molds to prevent the polyester material from becoming laminated to them.

Heat seals. A characteristic of type A is its ability to be adhered permanently to many other materials and to itself with heat and pressure only—no adhesives required. Its heat-sealing temperature ranges from 250° to 300°F.

These qualities provide for effecting seals heretofore not feasible. For example, an overlap seal where two non-sealing surfaces are in contact with one another can be produced, as well as the end seal of an overwrapped package where two surfaces of even the same material will not seal, uncoated aluminum foil, for instance. Laminated to paperboard, type A opens up possibilities of heat-sealable cartons.

TYPE TC

Basically, type TC is type A oriented in both the machine and transverse directions and then coated. It is a self-supporting, heat-sealing, heat-shrinkable film.

Functional Properties of Type TC

As with type A, the discussion of the various properties of type TC will deal with values which represent typical or average test data and not minimum design values. (See Table II) Type TC is a clear, transparent film with a haze

value of approximately 5 to 6 per cent. It is currently available only in a thickness of 0.0004 in. (40 gauge).

Seals without shrinking. Although the bare film will heat seal under pressure to itself, it is thermoplastically coated on both sides to insure good machine-handling characteristics. With this coating, it will seal immediately at temperatures ranging from 175° to 225°F.

Type TC can be heat sealed without developing shrink at the seal area. It can be done either continuously or intermittently. The shearing strength of such seals is 4 + lb/inch-width. The "trick" in accomplishing heat seals on shrinkable type TC without pucker is simple, inexpensive, and easily adaptable to existing machine operations.

Foil does the trick. What's the "trick"? Simply this. An unheated piece of foil or other thin material is introduced between the area to be sealed and the heated sealing wheel or platen. The foil protects the type TC from heat which radiates from the advancing heat source until the roller or platen is holding the type TC in place.

The same protection is furnished by the foil as the heat source is leaving the seal area. For such heat-sealing, a continuous belt can be fabricated from 0.0005-in. foil laminated to 0.0005-in. Mylar polyester film. Such a belt has adequate endurance and is thin enough to transmit heat readily to the type TC. Temperature, pressure, and time operating ranges are adequately wide for commercial conditions.

Foil is somewhat preferable to other thin materials, such as paper, because, in addition to protecting the type TC from heat radiation, it also diffuses the heat rapidly from the actual seal area during contact. However, other materials work well.

Strength properties. Some properties of the film are virtually the same as for type A, having been changed very little during orientation. However, orientation improves its mechanical properties, especially impact strength, tear-resistance, and elongation. The tensile strength is increased to approximately 9,713 lb/sq. in. longitudinally and 10,416 lb/sq. in. transversely. The very short elongation factor of type A is increased to 15 and 20 per cent in the longitudinal and transverse directions respectively.

By the orientation process, the tear resistance is increased to 33 gm/0.001 in. in both directions. The impact stength, tested by the falling ball impact test, ranges from 63 in. at 77°F. to 37 in. at 0°F. These latter two properties indicate the film is tough and that it can withstand much handling. Demonstrating this durability, it is presently being commercially used to overwrap half-hams.

Shrinking the film. Tailored through orientation to possess certain desired properties, type TC is stable toward heat until a temperature of about 147°F. is reached. Above this temperature it will shrink at a fairly rapid rate as heat is increased. Fig. 2 shows temperature versus rate of shrink in both the longitudinal and transverse directions.

At a temperature of 190°F., for instance, the material will shrink to approximately one-quarter of its original area. This is determined by the fact that, at this temperature, it will shrink about 45 per cent longitudinally and 60 per cent transversely. (See Fig. 2) Shrinking of a type TC package can be accomplished by hot air or hot water. The use temperature of the heating medium will depend upon how much shrinkage of the film is desired for a given product.

Referring to Fig. 3, about 80 per cent of the light in the visible spectrum is transmitted through type TC. This increases to as much as 85 per cent as the infrared region, 760 mμ, is reached. In the near ultraviolet and below about 300 mμ, no light is transmitted.

Permeability. The water vapor and gas transmission rates of type TC are approximately the same as for type A, considering like thicknesses. Thus, the material cannot be recommended for any products which require respiration, such as fresh red meats, fresh fruits, and vegetables. Its low service temperature makes it adaptable for packaging refrigerated and frozen products.

Tests to date indicate that both types are quite impervious to odor transfer and impart no odor or taste to products; nor do they take on odor or taste from products. They burn with difficulty and are self-extinguishing. (*End*)

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Mr. Vaughan's penetrating discussion typifies our authoritative coverage of the fast-moving field of packaging materials —along with other articles of current technical and operational packaging interest. To get an extra copy of this or any other article, write us on your letterhead, specifying what you want. As long as our supply lasts, we'll send you a free copy of the article you request.

Use of "working" departments, attention to many sources of packaging information, installation of a concise but informative "packaging requirements form" — all these tie together, forming an integrated packaging system. Mr. Farnham outlines this system's effectiveness when applied to such hard-to-package parts as fuel spray nozzles.

Three-part packaging system pays off

By Stanley E. Farnham,
Project Engineer,
Delavan Manufacturing Company,
West Des Moines, Iowa

Packaging fuel spray nozzles used in automotive, marine and aviation gas turbine engines, and rocket and ramjet engines presents some challenging problems. These highly complicated nozzles are designed to maintain precise flow rates and spray cone angles. Some nozzles currently in production require as many as 29 separate parts. To accomplish the "controlled spray," microscopic tolerances and highly polished finishes are required for the metering slots and orifices upon which the accuracy of a nozzle depends.

Four Complicating Problems

Our packaging system overcomes four major problems caused by our product which complicate our packaging operation.

1. Our fuel spray nozzles are of varying shapes and sizes. (See Fig. 1) Nozzle designs number in the hundreds and spare parts add to the lengthy list of different parts that must be packaged.

2. Fuel spray nozzles present unique technical packaging problems. The tiniest hairline scratch on the intricate metering parts of the nozzle can adversely affect the capacity and quality of the spray. Critical surfaces require fingerprint suppression and special cleaning processes.

3. Quantities vary greatly. For developmental parts, quantities are small. Often only three or four nozzles of a particular design will be shipped. As the nozzle enters the production stage, quantities may be in the hundreds or thousands, depending upon the customer requirements. For these large quantities, the parts are not ordered on one purchase order. Usually several purchase orders received over two or three years will cover different production runs of the same part. Obviously, this complicates the placement of orders for packaging materials.

4. Diverse customer requirements increase the complexity of our packaging operation. Some customers attach explicit packaging requirements to purchase orders. Others may list one of their own general packaging specifications or a government specification with which compliance is required. With different military and customer requirements, standardization of packaging materials is difficult and the stock of a multitude of paper, cartons, vials, and pouches is a continuing packaging headache.

Hit On A System Of Control

From this maze of diverse customer requirements, size, and quantities, we have evolved what we consider an efficient packaging control system. **The hub about which this system operates is the packaging requirements form.** But regardless of the merit of a form, *people* make a system work. Five departments receive the packaging information from the packaging engineer. (See Fig. 2) These departments are:

Production control
Production methods
Purchasing
Shipping (packaging)
Quality control

What Our Departments Do

These departments are the "working" departments of our system. We have no task force nor separate line organization. Instead, the packaging operation is integrated into the normal company line organization. These departments apply to packaging the know-how of their specialty that is applied to any other company function.

Stanley E. Farnham attended Drake University and Central Missouri State and Kansas City University. Prior to joining Delavan (where his basic responsibilities include packaging and engineering publications), he was with the Westinghouse Aviation gas turbine division, engineering department, more than three years. During the Korean war, he was a paratrooper. With requirements for degrees nearly completed, in addition to engineering, he has specialized in journalism and law.

The packaging responsibilities of each department are clearly defined in the company procedure manual.

Purchasing selects the sources from which packaging materials are purchased, talks to salesmen from prospective vendors, and accomplishes most of the correspondence with suppliers.

Quality control samples incoming packaging material to insure that it meets the requirements of the packaging specification. It also inspects the final package from the data supplied by the packaging engineer. Inspection conducts the necessary tests to determine adequacy of new packages. Tests for which inspection does not have the testing equipment are accomplished by independent testing laboratories.

Methods is concerned with time and operations. Recently, the entire packaging was moved to a new adjoining building because of the tremendous increase in packaging activity.

Production control schedules all shipments, prepares packing lists, and other necessary paper work. The production forecast it publishes is used by the buyer together with the packaging requirements to estimate packaging materials needed.

The shipping department accomplishes the necessary work to "get the product out the door" in packages that will insure that the part will arrive at the customer's plant in the same condition that it was shipped.

Where We Get Information

These departments act on information supplied by the packaging engineer. To prepare the technical information, the packaging engineer has available the assistance of nearly every department in the plant and several other sources. The groups shown in Fig. 3 can be likened to a staff for the packaging engineer. Much of the assistance received is a continuing process of education that helps the

Fig. 1. Typical examples of varying shapes and sizes of precision manufactured spray nozzles packaged at Delavan. Micrometer (left foreground) is set at 1 in. to indicate relative nozzle sizes.

Fig. 2. Five "working" departments participate in Delavan's packaging system. These departments, shown above, receive and act on packaging information which the packaging engineer furnishes them.

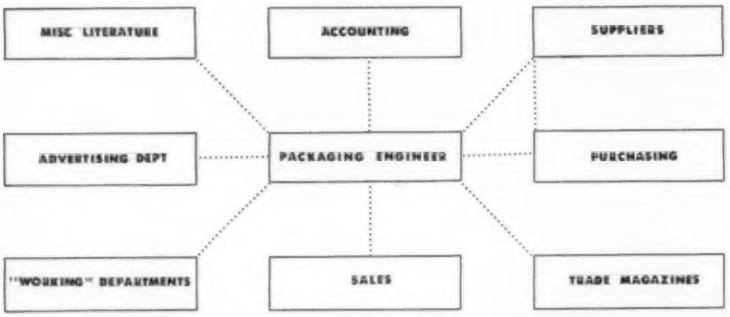

Fig. 3. These sources furnish information and assistance to the packaging engineer and directly or indirectly help him in formulating new packages for Delavan. Note attention to sources outside the company.

packaging engineer to keep up with the increasing pace of technological advance and the complexities of modern equipment.

Technical and business magazines and our suppliers keep us informed on new products, methods, and developments.

Accounting supplies cost data to guide the development of economical packages. If the packaging engineer does not have this information and does not apply it, then "maximum protection at minimum cost" is a meaningless phrase.

Advertising is consulted when any advertising is required. It knows best how to integrate advertising within the over-all company advertising concept.

Sales keeps the packaging engineer informed on customer reaction to packages. Sales sometimes uses the packaging form to assist in pricing nozzles and for background information when talking to customers.

Firsthand comments by line personnel and the packaging foreman are invaluable for future work. They often suggest changes that prove highly beneficial.

Packaging literature is of course helpful. **Military specifications** are essential to much of our packaging.

Information from customers is perhaps the ultimate test of the effectiveness of our packages. In one instance, suggestions from a customer resulted in a cost saving on our packaging and we were able to effect a price reduction on the nozzle.

The packaging engineer has the over-all responsibility for the packaging system. He coordinates the activity of these groups, organizes and classifies information, and reduces the data to clear-cut instructions for the working departments. In this respect, the packaging engineer's job is partially managerial.

One-Page Form Does The Job

The packaging requirements form is the packaging engineer's basic control and communication tool. (See Figs. 4 and 5) This single-page form provides all the necessary information required for each of the "working" departments. When we first began this system in 1954, the packaging requirements form was used only for spare parts; nozzle assemblies were covered by detail specifications.

However, the form has proved so useful that our specifications are now used only for reference, training new personnel, and to cover such general things as vapor degreasing and marking. Because the packaging form communicates all the necessary information simply and effectively, we can rely less on lengthy specifications.

This form has many advantages. It is simple, easy to follow, yet detailed enough to provide the necessary information. It provides spaces for all packaging phases and marking. The form is an excellent check list for the packaging engineer when he prepares the technical requirements. The standardized format systemizes collection of data, gives people a clear-cut procedure to follow, and improves coordination.

Let's examine how this form is developed and how it is used. The customer purchase order triggers our system. Each purchase order is routed to the packaging engineer for review. The more than 230 purchase orders processed in the first six months of 1958 indicate the amount of packaging activity. The purchase orders involved approximately 400 different nozzle assemblies and parts.

Choice Of Three Actions

The packaging engineer has three courses of action which he can take depending on purchase order requirements.

1. If the order is for *a part for which there is already a packaging*

form in existence and packaging and marking have not changed, he has only to add the purchase order number to the "purchase order" block on the packaging requirements form. The purchase order is an important item on the form because there may be several packaging forms for the same part if it is common to several nozzles.

2. If the purchase order requires *a packaging or marking change to an existing package,* then the packaging engineer changes the appropriate form indicating in the revision block the date of the change keyed to a symbol which indicates the packaging phase that has been changed.

3. If the purchase order is for *a new part for which no package exists,* the packaging engineer considers two questions before developing a new package. What does the customer require? Can the item be packaged like a previous part? If a previous package can be used, we may be able to eliminate extensive pre-production tests of packages and keep the different kinds of packaging materials and methods to a minimum. If a previous package can't be used, then he considers combinations of existing packages. In short, we achieve standardization by reconciling customer requirements with our packaging methods.

After determining the technical requirements the packaging engineer completes the packaging requirements form and issues a copy to each of the five "working" departments. He files the master in a notebook. If a package is revised, the packaging engineer reissues the form after making the appropriate changes. A revision symbol in the right margin of the form indicates the revised packaging phase. Only the packaging engineer is authorized to change the packaging requirements form.

Because the form is issued shortly after receipt of a purchase order, packaging of parts may not occur for several weeks or months. This interim period gives the departments time to check how the different requirements affect them.

Cooperation Pays Off

Even though a new package has been tested and checked before the form is issued, this brief review by each department may reveal improvements. An example of this is the following conversation between the buyer and the packaging engineer.

Buyer: "I notice you specify carton X on the packaging form for the 7880 nozzle. We've just obtained information on a new carton that costs less. This new carton looks just as good as carton X to me."

"Do you have samples of the carton?"

"Yes, do you want to check them out?"

"Sure, I'll be down to pick them up and I will see if the carton will do. I'll let you know if we can use it."

In this instance, which actually occurred, purchasing obtained information from one of its suppliers that reduced the cost of a package. This conversation also illustrates **the cooperative relationship and exchange of know-how between departments. These are the items that can't be spelled out in a procedure manual but mean so much**

DELAVAN MANUFACTURING COMPANY
West Des Moines, Iowa
Packaging Requirements Form

Revised
2/28/58 (a)
6/12/58 (b)

Applicable Contracts & Purchase Orders	Screening Date
P.O. JEP 50237	
Mark as AF41(608)8088	10/14/57
P.O. JEP 53691	
Mark as AF41(608)7693	1/13/58

Customer Part No. 318468 DLN Part No. 3173
Part Name DEFLECTOR
Air Force Stock No. 2915-592-9943-318468
Navy Stock No.
Unit Pack Std. Qty. 25 Unit of Count EA
Preservation, Packaging Method & Specification IC-1 MIL-P-1168
ANA Packaging List No. PT-1221

PHASES OF PACKAGING		DLN Procedure	Applicable Specification
Cleaning	Vapor degreasing.	PS111	MIL-T-7003
Drying	Natural air drying.		
Preservation	(O) No compound.		
Wrapping	Polyethylene bag (0.002 in), 3" x 5" (unsealed) to contain 25 parts.		MIL-P-3803
Unit Pack	(ENA) VP-210T pouch 2½" x 3" heat sealed to contain one poly bag. (25 parts)		MIL-B-117
Intermediate Pack	Folding carton 4" x 3" x 5" to contain 20 pouches. (500 parts) Mtrl. thickness .024" Gross wt. limit - 1 lb.		PPP-B-566 Style II Type A
Cushioning Material	Cushioning material, cellulosic, used to fill voids in folding cartons.		PPP-C-843 Type III
Shipping Container	Domestic corrugated fiberboard (275 lb). Gross wt. limit 65 lb. Closure: 60 lb. Kraft gummed tape (3" wide)		LLL-B-631 (RSC) UU-T-111b
Marking (Pkg.)		PS160	MIL-STD-129A (Ref)

REMARKS
Polyethylene wrap to form a flat package approximately 1½" x 1½" containing parts in a flat position, not on edge.

Fig. 4. This form indicates information listed for a typical spare part — in this instance packaged for the military. Form used above provides necessary packaging data for "working" departments shown in Fig. 2.

to the success of the operation. All literature received is circulated among the departments. Each department keeps the other department fully apprised of new developments.

Can't Isolate Activities

Many of the packaging responsibilities are interrelated and we have found that you can't dissociate the efforts of the packaging engineer from those of the other departments, or for that matter the efforts of any of these departments.

Each department, after reviewing the form, files its copy in a notebook by part number. The four-digit part numbers are like page numbers in the notebooks. A form can be located quickly and easily.

Parts are processed through the plant on a shop order card. When the part is shipped, the accounting department receives the card. From information on this card it prepares cost data on every phase of the manufacture (including packaging). This information is of course available to the packaging engineer.

In this day of specialists a great deal of assistance is available to make the packaging engineer's task easier and to achieve that well-known packaging objective of "maximum protection at minimum cost." **By dividing the work load and letting each department assume the responsibility it is best suited for by experience, training, and place in the company organization, we believe we can achieve the objective.**

Testimony to this is the fact that although our volume has skyrocketed (eight times what it was six years ago), the manhours required by the packaging engineer to continue to accomplish his responsibility have not increased materially and packaging costs per item have been reduced.

Six Steps To Effectiveness

If we were beginning from scratch, we could probably apply many rules today, some of which we were not aware of nearly five years ago when we inititated this system. The rules, however, are guides in improving our present system. Our packaging system is guided by:

1. **A clear description** of the responsibilities of each department with an accurate diagram of the flow of information throughout the plant.

2. **Placement of over-all responsibility** for the packaging function; we think the proper place for this is in the **engineering department.**

3. **A simple form** that gives the necessary information to each department concerned with packaging.

4. **A free, unrestricted flow** of literature and other helpful information between departments. This applies especially to the relationship between purchasing and the packaging engineer.

5. **Beneficial use** of the sources available; the specialist who can offer expert advice (such as technical and business magazines, suppliers, and sales, advertising, and accounting departments).

6. **Management support.** This probably goes without saying but the packaging engineer must **keep management informed** and **"sell"** sound packaging ideas.

Our system is tailor-made to fit

(*Continued on Page 71*)

DELAVAN MANUFACTURING COMPANY
West Des Moines, Iowa
Packaging Requirements Form

Revised

Applicable Contracts & Purchase Orders	Screening Date
201-1580635MX29H	7/1/58

Customer Part No. 327B555 DLN Part No. 6465
Part Name NOZZLE, FUEL
Air Force Stock No.
Navy Stock No.
Unit Pack Std. Qty. 1 Unit of Count EA
Preservation, Packaging Method & Specification As Noted Below

PHASES OF PACKAGING		DLN Procedure	Applicable Specification
Cleaning	Parts cleaned before assembly. Final flushing is final cleaning.		
Drying	Natural air drying.		
Preservation	Not required.		
Wrapping	CA Plug CD 3 on inlet fitting and 1/2 SC on nozzle tip. 1 sheet Nylfoil 3 x 4 inches around flanges and flowdivider.		MIL-P-3803 MIL-B-121 MIL-A-148
Unit Pack	IA-8 pouch 3 x 5 inches ID, heat sealed to contain one wrapped part.		MIL-B-131
Intermediate Pack	Folding carton 4 x 3 x 5 inches to contain 2 pouches. Mtrl. thickness 0.024 inch. Wt. limit (1 lb)		PPP-B-566 Style II Type A
Cushioning Material	Cushioning material, cellulosic, used to fill voids in folding cartons.		PPP-C-843 Type III
Shipping Container	Domestic corrugated fiberboard (200 lb) Gross wt. limit (65 lb)		PPP-B-636 (RSC)
Marking (Mfg.)		PS189	MIL-STD-129 (Ref)

REMARKS MARK UNIT AND INTERMEDIATE PACKS:
NOZZLE FUEL
SER. NO.____ (correct serial no., unit pack only)
MDL 6465
DELAVAN MFG CO
XXXX (correct P.O. No.)
327B555

Fig. 5. All information necessary for packaging the typical nozzle assembly appears on this form. Thus concisely confined to one sheet, this information so crystallizes the heart of Delavan's packaging system.

Riegel Announces

NEW TRI-PLEX PAPER

for Semi-Rigid Bags

Ask your bag supplier to show you this new packaging development

(RIEGEL DOES NOT MAKE BAGS)

Tri-plex is an unusual combination of three special Riegel packaging papers laminated together to form one sheet with superior rigidity for high speed production of semi-rigid bags. It's a brand new Riegel development, ideal for things like cookies and crackers. Makes a fine protective bag that stacks well and holds its shape. Excellent grease-proofness. Shortening will not wick through seams, folds and creases. High moisture protection keeps cookies crisp longer.

Riegel's Tri-plex has an excellent white surface for fine printing results. Bags can be supplied with heat-sealed closures. We believe Tri-plex now provides your bag maker with a truly superior material . . . at an attractive price.

BAGS
COURTESY OF:
Arkell & Smiths,
Hudson Falls, N. Y.

Riegel

PROTECTIVE PACKAGING MATERIALS

RIEGEL PAPER CORPORATION • 260 MADISON AVENUE • NEW YORK 16, N.Y.

How to locate optimum placement of cushioning for liquids in glass containers

By Allyn C. Beardsell,
President,
and Jerome J. Kipnees,
Assistant to the President,
Container Laboratories, Inc.
New York, N. Y.

PART II: ***How to find the optimum technical solution***

(Editor's note: The first article in this three-part series dealt with the exploratory study of packaging for twelve 4/5-quart bottles of whiskey. It appeared in our October issue.)

Summarizing the initial findings, packaging Code A (double-wall box; single-wall test partitions) and Code B (single-wall box; single-wall test partition, liner and pads) were both found to have adequate performance values. Packaging Code D (single-wall box; single-wall non-test partitions, liner and pads) was found to be deficient in protective qualities and was considered to be an unsatisfactory packaging method for the shipment of this product. **Unquestionably, the majority of shipping damages experienced by the distiller came from the use of Code D packaging.**

Code C packaging (single-wall box; single-wall test partitions) was discovered to be almost as good as the standard packaging (Code A) in performance, but some 25 per cent less in cost. **It was the opinion of our engineers that Code C would make a satisfactory shipping container at a very substantial saving, particularly if the quality of C were improved to its ultimate commercial efficiency by the best selection of secondary details, such as (1) good fabrication by the boxmaker, (2) the right direction and size of flutes (corrugations), and (3) snugness of fit.** Accordingly, in the second investigation, with which this article is chiefly concerned, alternate variations of the basic Code C specification were examined.

Materials In Second Study

Materials involved in the second investigation consisted of a total of more than 900 boxes with interior packing, divided into nine groups of approximately 100 each. Eight of the nine groups represented different varieties of Code C. The variations were confined to the flute of the corrugations (the direction always being vertical) in the single-wall outer shipping containers and to the flute and direction of the corrugations in the single-wall test partitions.

These variations are summarized below. The initial "C" indicates that the group is a variation of the original Code C packaging. The first letter in the parenthetical expression denotes the flute of the corrugations in the *box*, the second letter indicates the direction of the corrugations in the *partitions*, and the third letter expresses the flute of the corrugations in the partitions.

Thus "AVA" indicates an A-flute box with vertical A-flute partitions, and "BHB" denotes a B-flute box with horizontal B-flute partitions.

The ninth group, designated Code E, consisted of a single-wall box with double-wall test partitions and single-wall test bottom pad.

Packaging analyzed:

1. C (AVA)
2. C (AHA)
3. C (AVB)
4. C (AHB)
5. C (BVA
6. C (BHA)
7. C (BVB)
8. C (BHB)
9. Code E

Making Of Tests

Testing procedures employed for

There's a lot more to a study of this sort than the first series of tests given last month in Part I. Code C, you will remember, showed up best but that's not enough. To do a thorough job, it is next necessary to find out what materials, what fluting, and what direction of corrugations give the optimum protection. Yet even this is not enough, for still further testing is needed to relate optimum technical protection to feasible cost of such protection. The latter will be told next month in Part III.

Circle No. 226 on Card I

Paper Coated with SYL-OFF

lifts easily and cleanly from all sticky products

Here's a new, effective way to speed processing and handling of sticky products. How? By using packages or interleaving sheets coated with one of the new SYL-OFF* silicone paper coatings. SYL-OFF coatings speed handling, reduce product waste, provide a new selling advantage.

A SYL-OFF coating gives excellent anti-adhesive properties to paper and paperboard containers — from glassine to boxboard. Permits removal of all the product quickly, without sticking and tearing. Even the gummiest products won't adhere to a SYL-OFF coating. Of over 100 materials tested — including asphalt, candy, glue, adhesive, unvulcanized rubber — none was found to stick except a silicone adhesive!

If you process, stock, or ship sticky materials, a SYL-OFF coating will benefit you and your customer in time and money saved.

Even the stickiest pressure-sensitive adhesive film without a backing doesn't stick to interleaving packaging sheets coated with a SYL-OFF coating.

A SYL-OFF Coating Offers These Advantages

- Won't migrate, transfer, or contaminate.
- Doesn't alter papers' features.
- Costs little more, if any, than ordinary anti-adhesives.
- Lasts as long as the stock itself.
- Reduces shipping costs—lighter in weight than conventional coatings.
- Improves water repellency.

Write Dept. 5211 for free samples, full information, list of suppliers on request.

Dow Corning
CORPORATION
MIDLAND, MICHIGAN

* T. M. Dow Corning Corporation

TABLE I

Tests on Combined Board

Identification	Bursting Tests (lb/sq. in.)	Puncture Tests (Puncture Units)	Flat-Crush Tests (lb/sq. in.)
C (AVA) Box	192	208	22.4
2-Part Partition	187	213	30.7
3-Part Partition	190	208	32.1
C (AHA) Box	192	191	25.9
2-Part Partition	180	199	28.1
3-Part Partition	180	180	27.2
C (AVB) Box	197	202	24.8
2-Part Partition	184	194	47.7
3-Part Partition	182	192	46.8
C (AHB) Box	195	202	24.2
2-Part Partition	177	179	37.8
3-Part Partition	177	166	36.3
C (BVA) Box	199	181	41.3
2-Part Partition	182	194	29.0
3-Part Partition	186	212	32.0
C (BHA) Box	194	183	43.1
2-Part Partition	186	190	28.7
3-Part Partition	178	186	27.9
C (BVB) Box	198	186	44.6
2-Part Partition	179	183	44.0
3-Part Partition	178	188	43.2
C (BHB) Box	192	171	44.1
2-Part Partition	178	170	45.1
3-Part Partition	182	166	42.2
Group E Box	196	196	23.0
2-Part Partition	256	307	17.3-29.0*
3-Part Partition	257	319	19.0-29.7*
Bottom Pad	197	195	24.3

* In the double-wall partitions, the two layers of corrugations always failed consecutively. The A-flute collapsed first at the lower pressure and then the B-flute collapsed.

TABLE II

Compression Tests on Boxes (Load in pounds)

	C (AVA)	C (AHA)	C (AVB)	C (AHB)
Top-to-Bottom:				
Average load at ¾-in. deflection	620	647	619	604
Standard	693	693	693	693
% of Standard	90%	93%	89%	87%
Average maximum load sustained	628	647	638	612
Average deflection at maximum (in.)	0.80	0.61	0.80	0.75
End-to-End:				
Average load at ½-in. deflection	666	646	683	670
Standard	662	662	662	662
% of Standard	101%	98%	103%	101%
Average maximum load sustained	717	711	765	706
Average deflection at maximum (in.)	0.64	0.66	0.60	0.58

	C (BVA)	C (BHA)	C (BVB)	C (BHB)	Group E
Top-to-Bottom:					
Average load at ¾-in. deflection	540	579	530	600	702
Standard	554	554	554	554	693
% of Standard	98%	105%	96%	108%	101%
Average maximum load sustained	540	579	530	600	702
Average deflection at maximum (in.)	0.54	0.52	0.56	0.59	0.74
End-to-End:					
Average load at ½-in. deflection	842	828	846	868	706
Standard	794	794	794	794	662
% of Standard	106%	104%	107%	109%	107%
Average maximum load sustained	892	888	879	892	773
Average deflection at maximum (in.)	0.58	0.54	0.60	0.52	0.56

this investigation were similar to the techniques used in the initial study.

For each of the nine groups, bursting (Mullen) tests, puncture tests and flat crush tests were made on the boxes and on each element of the interior packing. Compression tests and cushioning tests were made on boxes from each of the nine groups. Incline impact tests and revolving drum tests, which required the use of water-filled glass bottles, were performed on only five of the nine groups. These five groups were selected with the objective of checking the validity of the cushioning tests as criteria for the protection afforded the contents.

Ten boxes for each group sealed empty and *without* interior packing were tested individually in compression. Five were subjected to top-to-bottom compression and five end-to-end compression.

Incline Impact Tests

For the incline impact tests, 20 loaded boxes for each group were analyzed. Ten were tested with a side panel striking the backstop and ten with an end panel. In all instances the panel being tested was positioned flush with the fixed backstop of the incline impact tester. In both the side- and end-impact tests, half of the boxes were tested with the manufacturer's joint adjacent to the backstop and half with the joint away from the backstop.

Boxes were subjected to successive impacts as described for the initial study. At failure, the number of "foot-falls" (the summation of the product of the distance in feet up the incline multiplied by the number of releases from that distance) was noted, as well as the cell position of the broken bottle or bottles.

Cushioning Tests

Cushioning tests, employing the dummy wooden bottles previously described and the General Electric cushioning meter, were made on 28 boxes of each group. These rep-

resented two boxes for each of 14 different cell positions in which the detector head was located.

Of boxes tested with the end panel striking the backstop, eight cell positions were selected; the four in the middle row and the four cells in one of the outside rows running perpendicular to the backstop.

Of boxes tested with the side panel striking the backstop, six cell positions were selected; one of the middle rows and the adjacent outside row of the four rows running perpendicular to the backstop. Results in the untested cell positions did not have to be determined since they could be obtained by analogy.

Where manufacturer's joint was. Of the two boxes used for each cell position, one was tested with the manufacturer's joint adjacent to the backstop and the other with the manufacturer's joint away from the backstop.

Finally, ten loaded boxes of each

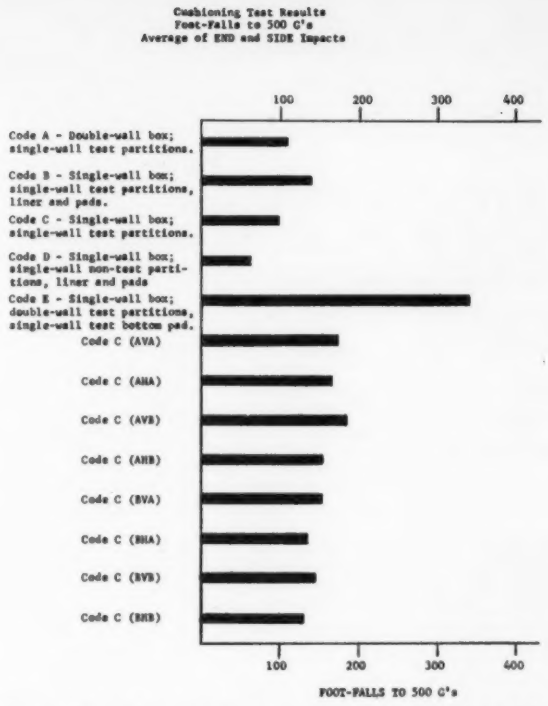
Cushioning Test Results
Foot-Falls to 500 G's
Average of END and SIDE Impacts
100
200
300
400
Code A - Double-wall box; single-wall test partitions.
Code B - Single-wall box; single-wall test partitions, liner and pads.
Code C - Single-wall box; single-wall test partitions.
Code D - Single-wall box; single-wall non-test partitions, liner and pads
Code E - Single-wall box; double-wall test partitions, single-wall test bottom pad.
Code C (AVA)
Code C (AHA)
Code C (AVB)
Code C (AHB)
Code C (BVA)
Code C (BHA)
Code C (BVB)
Code C (BHB)
FOOT-FALLS TO 500 G's

Fig. 1. Results of cushioning tests showing the number of foot-falls required to produce 500 G's, stated as average of the number of end and side impacts.

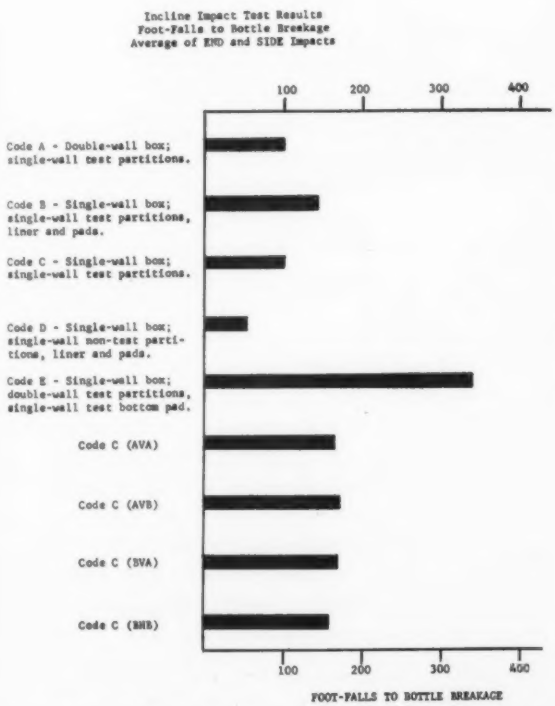
Incline Impact Test Results
Foot-Falls to Bottle Breakage
Average of END and SIDE Impacts
100
200
300
400
Code A - Double-wall box; single-wall test partitions.
Code B - Single-wall box; single-wall test partitions, liner and pads.
Code C - Single-wall box; single-wall test partitions.
Code D - Single-wall box; single-wall non-test partitions, liner and pads.
Code E - Single-wall box; double-wall test partitions, single-wall test bottom pad.
Code C (AVA)
Code C (AVB)
Code C (BVA)
Code C (BHB)
FOOT-FALLS TO BOTTLE BREAKAGE

Fig. 2. Results of incline impact tests stated as the average number of foot-falls from both side and end impacts to produce bottle breakage.

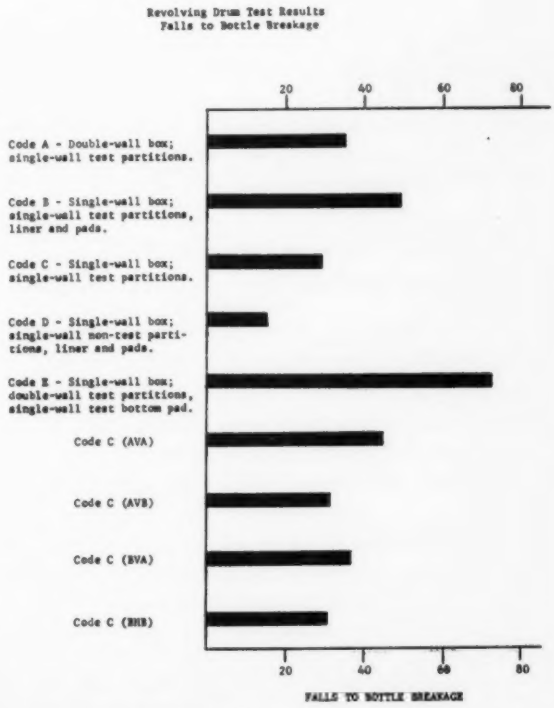
Revolving Drum Test Results
Falls to Bottle Breakage
20
40
60
80
Code A - Double-wall box; single-wall test partitions.
Code B - Single-wall box; single-wall test partitions, liner and pads.
Code C - Single-wall box; single-wall test partitions.
Code D - Single-wall box; single-wall non-test partitions, liner and pads.
Code E - Single-wall box; double-wall test partitions, single-wall test bottom pad.
Code C (AVA)
Code C (AVB)
Code C (BVA)
Code C (BHB)
FALLS TO BOTTLE BREAKAGE

Fig. 3. Results of revolving drum tests stated as the number of falls to produce bottle breakage.

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NON-STAINING THILCO-TUF

brings you a wonderful new way to save wrapping dollars . . . provides the "most wanted" functional features you asked for!

FULL PROTECTION—and these important use advantages

- Exclusive blond, elasticized laminant
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- Pliable . . . easy to handle
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- Eliminates needs for double wraps
- Saves materials and labor
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- Available trade-mark identified
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Machine Creped, Med. Fibre Reinforced

For protecting such products as:

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- Plastics and vinyls
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- Baling paper & rags

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Machine Creped, Heavy Fibre Reinforced

For protecting such products as:

- Upholstered furniture
- Carpets and rugs
- Cordage and twine
- Fabrics and yarns
- Unitized shipments
- Baling and bulking

Type LMB-34
Flat Kraft, Med. Fibre Reinforced

For protecting such products as:

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- Fabrics, textiles
- Boxed case goods
- Pictures and art
- Enameled metals
- Finished products

Type 30/30/30
30% Creped Stretch

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- Steel wire & cables
- Coiled hose & rubber
- Polished or finished wood products
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Single wrap THILCO-TUF eliminates need for costly double wraps

If stain-thru from duplex asphalted* grades is your problem, switch to THILCO-TUF for complete protection and save thousands of dollars annually! You save on materials and labor with this exclusive, *duplex-type single wrap* because you wrap *only once* to get all the protection required. THILCO-TUF features two sturdy kraft outer sheets bonded together with a new and improved blond laminant which *does not bleed, stain* or *delaminate* and has inherent "elasticity" which contributes to this wrapper's superior strength and puncture resistance. THILCO-TUF is oil, grease and moisture resistant, can be Poly-coated if desired and is available in widths up to 120" — Plain or trade-mark decorated for identity and sales value.

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Functional Papers
THILMANY PULP & PAPER COMPANY
KAUKAUNA · WISCONSIN

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group were individually subjected to revolving drum tests.

The test results are summarized in Tables I and II and Figs. 1, 2, and 3.

Comments On Data

Analysis of tests on the combined corrugated fibreboard disclosed a considerable improvement when compared to the fibreboard tested in the initial study. **The most significant improvement was in flat crush resistance, one of the chief factors affecting the cushioning resistance of corrugated fibreboard.** The bursting test values were improved but were still deficient, indicating that further attention was required. In general the puncture test values were favorable.

Compression test results were equally encouraging with average box rigidity ratings ranging from 94 per cent of standard to 109 per cent.

Cushioning test results, summarized in Fig. 1, disclosed that Code E (Single-wall box; double-wall test partitions) had the highest cushioning quality by an extremely wide margin. The best variations of Code C were notably superior to Code B, which was the best of the four groups tested in the initial study.

Even the poorest variation of Code C was almost as good as Code B, and was better than Code A, original Code C and Code D. In this connection, it should be borne in mind that Codes A and D represented the styles of packing then in most common commercial use by the distiller.

Fig. 2, illustrating the incline impact test findings, again shows the evident superiority of Code E. The Code C variations were also clearly superior to any of the four codes tested in the initial study. Fig. 3, summarizing the revolving drum tests, again shows Code E to be outstanding in the protection provided the bottles.

Final selection factors, in consideration of both performance and cost, are discussed in the third and final article in this series, appearing in next month's issue. *(End)*

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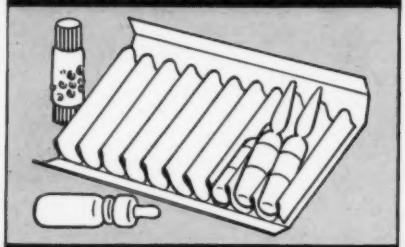
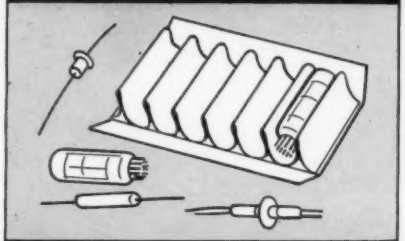
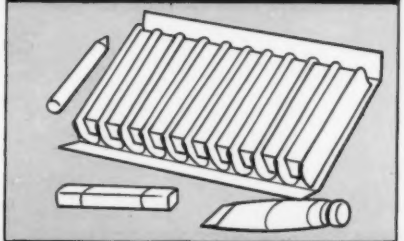


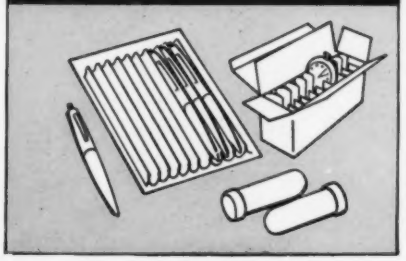
ELECTRONIC COMPONENTS



ARTISTS' MATERIALS



PENS AND OTHER ARTICLES



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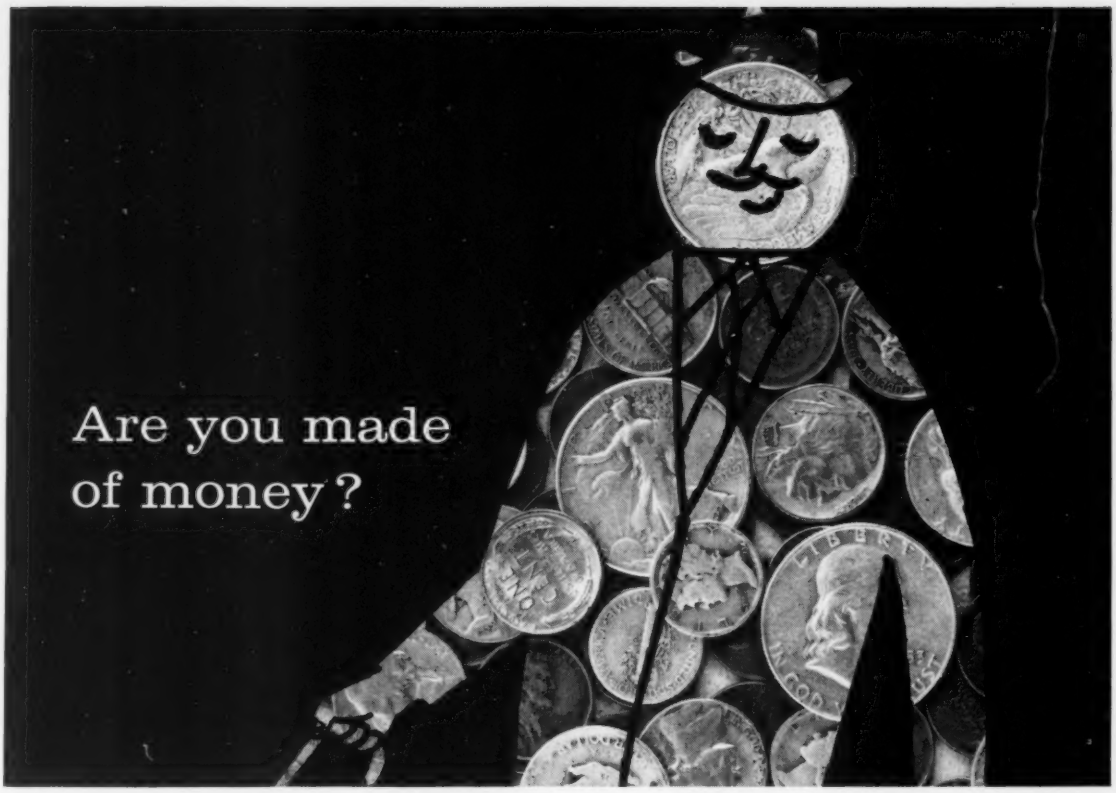

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How? Cartons and spacers with A-C Polyethylene coatings eliminate your need for liners. You save money and give your merchandise the best protection possible. Articles arrive in perfect condition, which means no returns because of scratches or blemishes. It's the A-C Polyethylene in the coating which holds paper fibers down so they can't scratch and damage fine finishes. Coatings score without cracking and flaking in the final fabrication and set-up stages.

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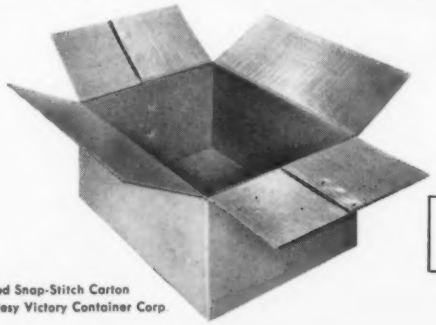

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William G. Hoskins is a graduate of Purdue University with a B.S. degree in mechanical engineering. During World War II he was an Air Force pilot. For the past 12 years, he has been with the Glenn G. Hoskins Company. This management and technical consulting firm, of which he is a partner, specializes in the macaroni-noodle field. Mr. Hoskins is a member of National Macaroni Manufacturers Assoociation.

Realistic policies on package weight control

By W. G. Hoskins,
Glenn G. Hoskins Company,
Libertyville, Illinois

Too many plant managers take an unrealistic view of package weight control. The practice of allowing an excessive tolerance of overweight is far too prevalent. Perhaps actual or potential experience with federal and state regulatory agencies has inhibited those who determine policies governing package weight control in their respective companies. On the other hand, some play it far too close to the line and are clearly risking the penalties accompanying distribution in trade of underweight packages.

Speaking specifically in terms of macaroni and noodle plants (of whose weight packages we recently made a detailed study), we urge every plant manager to be thoroughly familiar with two major areas: (1) Laws and regulations affecting package weights within his area of distribution, and (2) tolerances and variations that arise due to packaging machinery and human inaccuracies – as well as the effects of shrinkage.

Three Basic Rules

We submit that any realistic package weight control policy has these three major mandates:

1. Management should control its packaging lines so that the average weight of packages produced on these lines is exactly on, neither above nor below, the stated package weight. The only modification of this practice we can suggest is discussed elsewhere in this article; it involves states that require every package to be equal to or above the stated correct weight.

2. Management should insist on its plant keeping the moisture content of packages when packed as close as possible to the moisture content which the product could be expected to assume after a normal period on the store shelves.

3. Such a policy should clearly recognize that there will be some variation both above and below correct weight on the packaging machinery. This will also take place on hand packaging lines. Management should insist on keeping these variations within as narrow limits as possible. At the same time, we object to overweighing packages intentionally just because of these variations. Practically every state law recognizes the fact that some variations arise due to packaging machinery inaccuracy.

Too much product give-away. We started our study with a review of the state and federal laws. The trouble is that too many manufacturers strike an average overweight of 1/4 oz. on all packages "just to be on the safe side." The trouble with this view is that 1/4 oz. on an 8-oz. package is 3 per cent overweight. On a 1-lb. pack-

Here is a useful course through the sea of conflicting practices and opinions regarding package weight control. While this article rests on a detailed study of spaghetti and macaroni packages, it merits the attention of anyone concerned with package weights. Mr. Hoskins summarizes the findings of his organization in regard to state regulations, probable moisture loss from individual packages on store shelves, and the setting of packaging machinery for correct package weights. He shows how to avoid the perils of underweight packaging and at the same time, avoid the economic losses inherent in calculated overweight packaging.

age, this represents 1.5 per cent overweight. You can readily see that potential losses run extremely high with this sort of a policy.

At the same time, producers sometimes are lulled into security by the language of the Federal Standards of Identity. The plant manager or executive might say, "These standards let me pack macaroni and noodle products containing 13 per cent moisture. Why shouldn't I dry the product just as close to this moisture content as I can, put it in the package, and get it out on the shelf?"

What We Asked The States

So we have these conflicting views. Both are unrealistic, uneconomical, and out of line with existing regulations. Our efforts to find the correct view led us to investigate federal and state laws on the subject. We contacted and got replies from all 48 states and the federal government concerning their policies on package weights. Our organization sent questionnaires to all 48 state departments of agriculture, asking these questions:

1. Do you have a stated permissible variation from exact weight for macaroni, noodles, and spaghetti?

2. If the average weight of the packages checked is the same as the net weight printed on the package and none of the packages is more than the permitted variation under correct weight, would you consider the weight check satisfactory?

3. If you do not have a set permissible variation and the average net weight of packages checked is correct, even though individual packages may be high or low, within reasonable limits, would you consider the package weight satisfactory?

4. Do you require that every single package be equal to or above the stated weight?

5. Do your regulations make allowance for loss in weight due to shrinkage that takes place after a package leaves the factory?

The federal view. We asked similar questions of the U. S. Department of Agriculture. Incidentally, we found that the Federal Food and Drug Administration has no hard and fast rule. It recognizes the fact that individual packages will vary, both due to packaging machine tolerances and human tolerances. Interestingly enough, the Food and Drug Administration people told us that it was as much of a violation of the law to put more in the package than was specified as it was to put in less.

Watch Out For State Rules

We warn manufacturers against placing too much emphasis on the federal policy. It does allow for shrinkage after the package leaves the packaging line. Therefore, we strongly urge the basing of package weight policies on state laws. We find state regulations to be more stringent.

We learned that 8 states out of 48 had a stated permissible variation in package weights for spaghetti and noodles. These states and their permissible variations are as follows:

STATE	PERMISSIBLE VARIATION	
	1-lb.	½-lb.
Arizona	0.4 oz.	0.2 oz.
Colorado	0.25	0.25
Connecticut	0.5	0.25 (Mac.); 0.5 (Ndls.)
Illinois	0.5	0.25
Louisiana	0.16	0.08
Vermont	1	0.5
Virginia	0.16	0.08
W. Virginia	0.5	0.5

All of the other states have no set permissible variation. The 8 states having the permissible variations (as noted above) informed us that as long as the average weight of the packages checked is correct, the weight check would be satisfactory provided no package is off more than the permitted amount.

Allow reasonable variations. Most of the states take the view that if the average weight of the packages checked is correct and no individual package is more than a reasonable amount over or under, the weight check would be satisfactory. The following 34 states adhere to this view:

Alabama, Arkansas, Delaware, Florida, Idaho, Indiana, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Rhode Island, South Carolina, South Dakota, Texas, Utah, Washington, Wisconsin, Wyoming.

Delaware actually has no present law. Wisconsin reports that the label can state a minimum quantity. If it does not so state, the assumption is that the average quantity would depend on how much the weight varied.

Requirements Are Strict

Six states and the District of Columbia told us that they require every single package to be equal to or above the stated weight. These states are California, Georgia, Maine, Missouri, Pennsylvania, and Tennessee.

However, the Pennsylvania and Tennessee laws make the provision that reasonable variations are permitted in package weights. We learned that in Pennsylvania, manufacturers can apply to the Department of Internal Affairs for the granting of specific tolerances and variation in package weights.

Most of the states told us that they will allow for shrinkage due to evaporation after the product is in the package. Even so, our own interpretation of the bulk of the state laws is that the package would have to have been packed at a moisture level which was realistic for the area in which the product was going to be distributed.

No allowance for shrinkage. However, certain states make no allowance for shrinkage after the package leaves the factory. These states include Arkansas, Colorado, District of Columbia, Indiana, Iowa, Kansas, Maine, Maryland, Montana, New Hampshire, North

Moisture Check of Finished Packages in Lincoln, Nebraska in January, 1957

Product	Temperature (°F.) Outdoors	Temperature (°F.) In Store	Product Moisture Content
Elbow Spaghetti (Cello)	20	68	11.22%
Elbow Macaroni (Cello)	20	70	9.22
Elbow Macaroni (Cello)	20	70	11.42
Medium Noodles (Cello)	20	70	9.82
Elbow Macaroni (Poly)	35	70	11.50
Average			10.6%

Fig. 1. To implement policies outlined in this article, the Hoskins organization wanted to know what moisture level packages would attain after normal period on store shelves. Several manufacturers picked up packages from stores in their areas, ran moisture tests on them.

Moisture Check of Finished Packages in New Orleans in January, 1957

Product	Temperature (°F.) Outdoors	Temperature (°F.) In Store	Relative Humidity in Store (%)	Product Moisture Content
Egg Noodles	67	73	48	11.2%
Perciatelli	75	75	78	11.8
Thin Spaghetti	69	72	50	9.6
Spaghetti	73	70	53	12.0
Macaroni	78	72	68	11.4
Averages			59%	11.2%

Fig. 2. Even though these and other tests took place during winter rather than in summer, Mr. Hoskins believes average moisture content of products would be only slightly higher in summer.

Packages Picked up in Stores in Milwaukee County, January, 1957

Brand	Product	Wt. Of Pkg. (oz.)	Checked Wt. (oz.)	Temperature (°F.) Store	Temperature (°F.) Outdoor	Outdoor Humidity (%)	Per Cent Moisture*
A	Lasagne	8	8.61	68	9	51	8.7
B	Noodles	8	8.84	74	9	63	12.7
C	Shells	7	6.84	68	22	81	9.2
C	Elbow Mac.	7	6.85	68	22	81	9.9
C	Elbow Spag.	7	6.98	76	17	92	9.8
D	Wide Egg Noodles	12	13.13	68	22	81	9.5
D	Elbow Mac.	16	13.72	68	22	81	8.8
E	Elbow Spag.	6	5.75	75	0	50	10.5
F	Macaroni	16	15.63	74	9	63	9.4
G	Kluski Noodles	8	7.06	71	9	63	9.7
H	Vermicelli	16	14.09	68	22	81	8.9
I	Macaroni	16	16.46	72	9	63	9.2
J	Shells	7	6.84	73	9	63	9.8
K	Large Elbows	10	10.55	68	22	81	10.3
L	Tenderoni	6	6.25	75	0	50	8.8
M	Elbow Mac.	12	11.82	75	17	71	8.9
M	Shells	7	6.77	76	17	63	9.2
M	Elbow Spag.	12	12.01	75	17	71	9.5

*Probable store humidity: 30-40%.

Fig. 3. Based on the above tests (and those shown in other figures), Mr. Hoskins urges drying finished product to point where it contains 9.6 to 10.0 per cent moisture when packed. If dried to higher moisture content, it would "almost surely" lose weight when put on store shelves.

Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Washington, Wyoming.

A word of warning: Some states specifically told us they would take action against a manufacturer when the average package weights checked were 2 per cent low due to moisture loss. These states are Alabama, Arizona, California, Connecticut, Delaware, District of Columbia, Illinois, Michigan, Missouri, New Hampshire, Pennsylvania, Rhode Island, Tennessee, Washington, West Virginia, and Wisconsin.

Cutting through the haze of all this fine print and the replies the different states made to our queries, we soon detected a certain pattern. Typically, the states seemed to develop a representative view. Following is a good example of this. We quote paragraphs *m*, *n*, *o*, and *p* of Regulation 2, Order No. 352 of the Division of Foods and Drugs, Department of Agriculture, State of Washington. We think this represents a reasonable approach and we found similar statements and requirements in many state laws. So, the Washington statement as quoted below deserves attention.

"(*m*) The statement shall express the minimum quantity, or the average quantity, of the contents of the packages. If the statement is not so qualified as to show definitely that the quantity expressed is the minimum quantity, *the statement shall be considered to express the average quantity.*

"(*n*) Where the statement expresses the minimum quantity, no variation below the stated minimum shall be permitted except variations below the stated weight or measure caused by ordinary and customary exposure, after the food is introduced into interstate commerce, to conditions which normally occur in good distribution practice and which unavoidably result in decreased weight or measure. Variations above the stated minimum shall not be unreasonably large.

"(*o*) Where the statement does not express the minimum quantity—(1) Variations from the stated weight or measure shall be permitted when caused by ordinary and customary exposure, after the food is introduced into interstate commerce, to conditions which normally occur in good distribution practice and which unavoidably result in change of weight or measure; (2) Variations from the stated weight, measure, or numerical count shall be permitted when caused by unavoidable deviations in weighing, measuring, or counting individual packages which occur in good packing practice. But under subdivision (2) of this paragraph, variations shall not be permitted to such extent that the average of the quantities in the packages comprising a shipment or other delivery of the food is below the quantity stated, and no unreasonable shortage in any package shall be permitted, even though overages in other packages in the same shipment or delivery compensate for such shortage.

"(*p*) The extent of variations from the stated quantity of the contents permissible under paragraphs (*n*) and (*o*) of this

regulation in the case of each shipment or other delivery shall be determined by the facts in such case."

Checks Of Moisture Levels

Our study of these regulations led us to establish the three-point policy set forth in this article. But the implementing of the policy called for another sort of investigation. We wanted to know the moisture level that packages would attain after a normal period on store shelves. Several of our clients kindly agreed to pick up packages from stores in their areas and run moisture tests on them. Figs. 1, 2, and 3, show moisture checks of finished packages picked up in Lincoln, Nebraska; New Orleans, Louisiana; and Milwaukee County, Wisconsin.

One manufacturer produced and held packages of various types of products in normal indoor conditions at his plant for an extended period of time. Fig. 4 shows the results of this experiment. We would like to have had more of the tests conducted in the summer. However, we feel safe in suggesting that the average moisture content of the products in the summer would be only slightly higher than those listed above as checked under conditions other than summertime.

Make package weight checks. In making tests of packaging line accuracy, we had the opportunity of making package weight checks of products coming off macaroni-noodle packaging lines. Fig. 5 gives a representative review of these tests. We found the average overweight on the tests summarized in Fig. 5 was nearly 1 per cent. With the exception of distribution in states where no variation below correct weight is permitted, we do not feel that a 1-per cent average overweight packaging level is justified. Our opinion is that this 1 per cent appears in manufacturers' calculations of shrinkage and is a direct manufacturing loss.

Of course, manufacturers who distribute their products in California, Pennsylvania, and the other states which apparently allow no variation below stated weight, will have to base their packaging policies on actual experience with weight regulations in these states.

A Uniform Policy?

A piece of unfinished business for those concerned with packaging such products is getting a consistent policy in all states. We suppose that such a policy would stem from the federal policies. A worthwhile objective would be to induce the states having the restrictive regulations to replace them with a policy consistent with that of the majority of states.

Our recommendations for macaroni and noodles sum up our views on package weights as follows:

1. Manufacturers should dry all products to 9.6 moisture content in the winter; 10.0 per cent in the summer in all normal inland loca-

Moisture Checks of Finished Packages in Milwaukee County

Product	Moisture Content		Period Held
	When Packed	When Checked	
Elbow Macaroni (Cello)	11.8%	10.1%	May 31-Oct. 22
Elbow Macaroni (Carton)	11.8	9.5	May 31-Oct. 22
Elbow Macaroni (Cello)	10.6	9.9	Mar. 20-May 31
Elbow Macaroni (Carton)	10.6	9.8	Mar. 20-May 31
Long Spaghetti (Cello)	10.0	9.7	Apr. 13-Aug. 31
Long Spaghetti (Carton)	10.0	10.0	Apr. 13-Aug. 31
Shells (Cello)	11.2	9.6	May 4-Sep. 27
Shells (Carton)	11.2	9.0	May 4-Sep. 27
Elbow Spaghetti (Cello)	10.6	9.6	Apr. 27-Sep. 21
Elbow Spaghetti (Carton)	10.6	10.0	Apr. 27-Sep. 21
Medium Egg Noodles (Cello)	10.2	9.5	Feb. 24-May 10
Wide Egg Noodles (Cello)	10.1	8.8	Feb. 4-June 2
Averages	10.7%	9.6%	

Fig. 4. One manufacturer produced and held packages of various products for extended period of time in his own plant and under normal conditions. Above are results of this experiment.

In-Plant Tests of Packaging Line Accuracy
Variations in Ounces

Product	Machine	Number of Packages at Weight Level									Over Weight
		−¾	−½	−¼	−⅛	0	+⅛	+¼	+½	+¾	
12 oz. Bd. Noodles	A			7	9	25	5	3			0.3%
8 oz. Bd. Noodles	A		1	2	1	3	2	5	8	3	3.0
8 oz. Bd. Noodles	B		2	1	2	9	6	9	7	2	2.1
8 oz. Bd. Noodles	C	1	10	11	15	27	13	12	9	2	..
14 oz. Med. Noodles	C		5	6	3	19	7	23	20	17	1 6
1 lb. Lg. Spag.	D		1	1		4	2	3	4	2	1.3
	Hand Weighed										
7 oz. Elb. Spag.	E			1	2	23	17	7			1.0
8 oz. Wide Ndl.	A			1	8	30	13				..
7 oz. Lg. Spag.	Hand Weighed			2		28	15	6	1		0.9
8 oz. Lg. Spag.	Hand Weighed					14	9	7			1.2
1 lb. Elbows	C			2	2	12	4	8	4		0.7
5 oz. Bd. Ndls.	B				8	8	7	14	1		2.0
1 lb. Beans	F		2	1		43		17	8		0.6
2 lb. Beans	F	5	13	14		39		19	14	14	0.2
1 lb. S. C. Mac.	F		1	8		55		20	11	1	0.6
11 lb. S. C. Mac.	F	1	2	9		38		17	5		0.3
7 oz. S. C. Mac.	F		4	6		39		11	8	2	1.0
12 oz. S. C. Mac.	F		5	15		65		9	2		0.3
2 lb. Elb. Mac.	F	2	5	5		22		6	6	2	..
1 lb. Ital. Sty. Spag.	Hand Weighed			8		95		32	7	2	0.5
12 oz. Long Mac.	Hand Weighed			6		77		12		1	0.2
12 oz. Noodles	C			3		24		14	11	19	2.6
12 oz. Noodles	C	3	1	8		51		15	11	6	0.9
10 oz. Noodles	C			4		40		22	4	2	1.1
										Average overweight	0.9%

Fig. 5. Over period of several months the Hoskins organization made package weight checks of products coming off macaroni-noodle plant packaging lines. Average overweight on tests above was nearly 1 per cent. Mr. Hoskins says this 1 per cent appears in manufacturers' calculations of shrinkage and represents a direct manufacturing loss. He feels a 1 per cent average overweight packaging level is not justified except in states where no variation below correct weight is permitted.

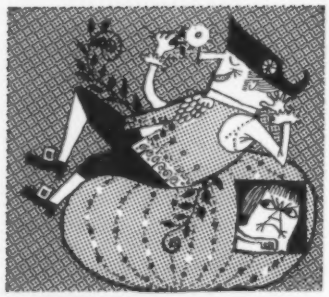
On this and preceding pages, Mr. Hoskins outlines the panorama of legal requirements, offers some practical policies for machine settings. On page 52 begins Part I of a three-part article by John E. Reynolds on the how-to-do-it aspects of establishing a package weight control program.

tions, and 11 per cent in the extreme South along the ocean and in humid areas.

2. Packaging machinery should be set so that the average weight of a substantial number of packages is neither above nor below the correct weight. We urge holding of variations of individual packages above and below at a minimum—consistent with normal operation of the machine and the effectiveness of people on the line.

At the same time, we inject a word of warning about California, District of Columbia, Georgia, Maine, Missouri, Pennsylvania, and Tennessee. Products packaged for these states must be at or above the correct weight, at least according to statements in the regulations.

Even in the face of special restrictions in certain areas, we still feel that many thousands of dollars can be lost needlessly through incorrect package weight control. We urge a four-part antidote for these losses. It consists of thorough knowledge of (1) state regulations; (2) probable moisture loss from packages or store shelves; (3) final moisture obtained in drying the product, and (4) specific knowledge of packaging machinery and weighing accuracies. (*End*)



WHEN Peter, the pumpkin-eater, started having troubles with his wife he put her in a pumpkin shell. Evidently he'd had a little experience with this sort of thing. He *knew* how to contain her.

Don't you design a package without pre-testing its effectiveness.

Modern packaging engineers pre-test designs with IMPACT-O-GRAPH. It reveals what shocks the container must withstand during normal shipping operations and when, where or if any damaging situations occur.

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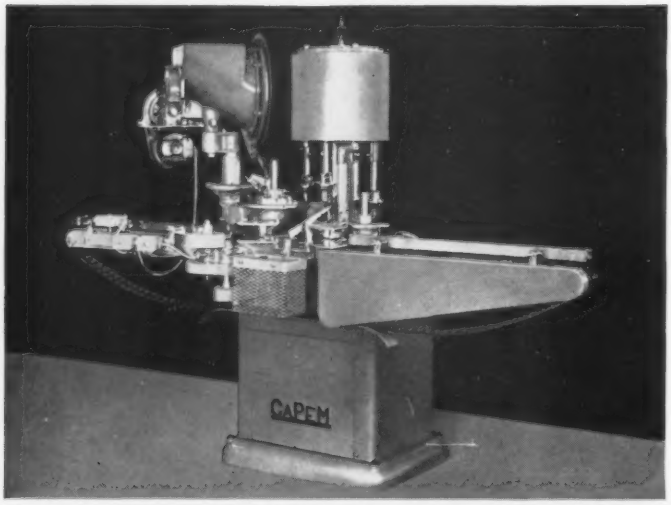

- Applies any type of standard screw cap or cover at speeds of 2,000 to 10,000 per hour.
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- Handles bottles, jars, cans or jugs of any size or shape.
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A practical approach to a weight-control program

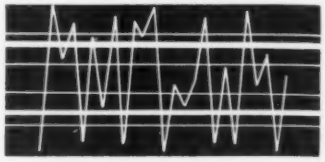
How much are your packages overweight?

Can they be underweight?

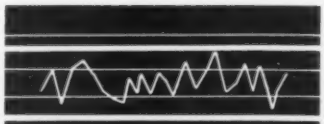
Do you need a weight-control system?

Do you know how to set up such a system?

Would your weight-control average chart look like this



or this



By John E. Reynolds,
Industrial Engineer,
The Tool Steel Gear and Pinion Company,
Elmwood Place, Ohio

During the past several years, a number of talks have been given, and quite a few articles published, on the subject of statistical weight control on packaging lines in the food and drug industries. Many of these were well done and very informative as far as stressing the value of such a system. However, very few of the basic facts about, and answers to, problems encountered in this field have ever been set forth; practically no mention has been made of the basic elements needed to initiate a weight-control system and to maintain it.

My interest in this subject stemmed from the fact that, at various times over the years, I have had the responsibility of initiating and establishing weight controls on packaging lines. This has covered some 20-odd types of foods which embraced close to 300 different sized packages.

One of my first problems was to find a method of statistical weight control to apply to simple filling lines for such products as gelatin and pudding. About the only information available was that in various articles telling how important such a program is, and how many thousands of dollars could be given away each year through overfilling or in governmental problems encountered through underfilling.

This was fine, but it didn't tell me how to set up a practical, workable weight-control system. Mention was made of some of the problems which might be encountered, but characteristically, no solutions. The one element that had been ignored completely was that of the methods employed in sampling. These are certainly very basic in any system.

Basic system evolved. Through trial and error, a basic system was evolved that could be adapted to most filling lines and products. But *having* a system was very far from *putting it into effect*. Many problems were found on which a decision had to be made, for which it was impossible to find any guide. When I bucked the problems upward, they were only returned with a notation advising me to make my own decisions with the material available. So I had to make my own rules.

Problems To Solve

Overweight or underweight? An example of a problem which needs a decision is that of packaging spices. Some, notably ground black pepper, will lose weight after packaging, while others will stay the same and some will even gain weight. The problems: Does one add weight to compensate for ex-

Controlling weight within a reasonable tolerance is not as difficult as it may seem. This first part of a three-part article reviews the problems involved, stresses the need of a weight-control program, outlines the necessary essentials for the testing of machine accuracy, and the procedure for sampling and testing filling equipment. The second and third parts will appear in our next two issues and will explain how to analyze the test data, how to determine the system to use, how to establish average overfill and allowable underweights, and how to establish control limits. Mr. Reynolds includes a general discussion on the weight-control system as a whole. He provides all necessary formulas for such a program.

pected losses? May he package underweight to take advantage of weight increases?

A similar problem involves whole roasted coffee beans which when packaged contain very little moisture, but from that point on absorb moisture until brewed. The amount of weight increase depends upon outside humidity. One-pound bags of roasted coffee beans have been known to have picked up as much as 1/2 oz. in two weeks when shipped into an area of high humidity. Knowing that coffee will pick up moisture, can it be purposely packaged underweight to take advantage of this pick-up in weight?

Weight-distribution curve. Probably the biggest problem of all is what per cent of the packages produced is desirable, or is permissible under the law, to be underweight. With the accuracy of the filler established and a control system set up, a decision must be made regarding the answer to this problem. Every machine will produce a weight-distribution curve, and as the average weight increases, the per cent of underweight packages will decrease.

Through the setting of control limits, it is possible to control the fill very closely at any weight, thereby maintaining a certain percentage of underweight packages –anywhere from 0 to 50 per cent. This may come as a shock to the uninitiated, but the idea of every package on the grocers' shelves containing exactly the stated label weight is a myth. To repeat, every filling machine produces weights that will form some sort of distribution curve. If the manufacturer sets the machine at the exact stated label weight, the housewife has a 50-50 chance of getting an overweight package. Looking at the situation from the other side of the fence, it's 50-50 she will get an underweight package.

How Accurate A Filler?

It has been argued that an accurate filler will not give overweights or underweights. However, by reducing the measuring increment from 1/8 oz. to 1/32 oz., or to 1/256 oz., a distribution will be found eventually. In my experience I have never had to go below 1/32 oz. to find a good distribution, even in the so-called highly accurate fillers.

This point of accuracy leads to another field which requires further exploration. As food for thought, some questions to be answered: How accurate should a filler be? What is good performance and what is bad? What does a filler manufacturer mean when he says that his machine will fill to within ± 1/8 oz., and on what does he base his statement? What per cent of the total number of packages produced is included in this ± 1/8 oz.? My limited experience has shown that very little is known of the answers to these questions, even by the filler manufacturers themselves. Certainly with the current interest in weight control and accuracy, these questions will be answered in the near future.

Tare weights. Another area which creates a multitude of problems is that of physically sampling any process. It is easy enough to establish a system calling for five samples from each filler head each half hour. But, when the machine has six filler heads, the container is glass (of which the weight varies more than the fill), and the product is peanut butter, complications can arise.

Products Present Problem

It would take at least half an hour just to remove all the peanut butter from one jar for an accurate weighing. Would it be reasonable to establish weight controls on the basis of the filled jar knowing that you are giving away extra product to compensate for jar weight variations? Or, is there some other way of establishing controls over a production line of this sort? The problem of tare weights is a constant headache to package users.

Hot products. Another variation on this problem is that of sampling a packaging line on which the product being filled is too hot to be touched by hand, such as preserves or jelly. If the line is to be sampled immediately after the filler to preserve the identity of the sample, the problem of heat becomes very great.

The jar is too hot (200° F.) to be lifted off the line by hand, and tongs or gloves invariably cause spillage and inaccurate weights. If the line is to be sampled after the jars have cooled (approximately 40 minutes), the identity of the sample has been lost and is, therefore, of no value for weight control at the filler.

Need For Weight Controls

This article offers a simple yet effective method of establishing a practical, workable weight-control system over most types of filling operations. Along with this will be some suggestions which should prove helpful in solving some of the previously stated difficulties.

There are quite a few companies (both large and small) with a definite need of weight controls.

(*Turn Page*)

John E. Reynolds received a B. S. degree in business administration from Xavier University in Cincinnati in 1948, and a master's degree from the same school in 1957. He also completed a one-year course in statistical quality control at the University of Cincinnati. Presently an industrial engineer with The Tool Steel Gear and Pinion Company, he started statistical quality control work in 1952 with the Cincinnati Milling Company. In the last few years, he has devoted much attention to statistical weight control and his experience includes the field of food processing and packaging.

Yet they shy away from taking any steps in that direction. Some of their excuses: "It costs too much" or "It's too complicated" or "We are doing all right the way we are." Their real reason is that they just don't know how to go about it on their own and are reluctant to seek advice elsewhere. Besides, someone might be embarrassed if it should be discovered that a company was *not* "doing all right the way we are."

This article tells how to find out just what the performance of any machine is, whether or not it needs improvement, and suggests a simple, effective method of controlling the operation. The system presented here is not new; its value lies in its being concise, effective, and specifically designed for packaging.

SET-UP FOR MACHINE ACCURACY TESTING

Sampling station. A preliminary examination should be made of the filling line to be controlled in order to determine the point on the line from which the samples will be taken and the place at which the measuring device will be located. This sampling station should be as close to the filler as is physically possible in order to eliminate weight variations which may occur in subsequent operations such as capping, tying, labeling, etc. This is done also to preserve the identity of the package—which filler head produced it? If this is unknown, the sample is of no value.

Unit to be tested. The testing is to be done on each unit that is controllable by itself. If each filler head of a machine is controllable, then each head must be tested individually. If the machine is such that there is one control for a number of pockets, then the whole machine must be tested at one time so that results will give comparisons of one pocket to another. This is done so that, before any system of weight control is introduced on this type machine, all the pockets or heads can be adjusted as nearly alike as possible.

Settings, Adjustments

When the pockets of a filling machine can be adjusted either individually or through a gang adjustment, it is usually best to set the controls on the individual filler heads. One exception to this would be a system in which the variation in the heads is the same, and in which this variation never changes. Needless to say, these are very few and far between.

Some other factors which might enter into the decision as to whether to set the machine pockets individually or through gang adjustment are: (1) Ease of adjustment in either case; (2) how well the individual fillers hold the designated weight; (3) validity of either sampling procedure, and (4) ease with which samples can be taken from the line and weighed.

Identification. Before any sampling is done, the filler heads or pockets should be permanently identified with numbers or letters, preferably in paint. This will insure that their identity is firmly established. Thus, data gathered will not lose its value through loss of identification.

Using Whole Numbers

Use of whole numbers. Any weight recordings, whether test or production control, should be done in whole numbers with the increments carefully noted. For example, if a machine is to be tested at 1/32 oz., a reading of 2/32 oz. over the scale zero setting would be recorded as +2 or simply 2; a reading of 3/32 oz. under the scale zero setting would be recorded as –3.

With this system, the data are easily read from the scale used, simply by counting the number of graduations above or below zero. The data are easily recorded, and more important, easily calculated for both immediate and future use. This point becomes particularly important as it can be done quickly and easily by the operating personnel on the production line who are expected to use this system. It has proven simple and effective.

Equipment. Experience has shown that a good, reliable scale is necessary both for testing and for maintaining weight control over production lines. It should be versatile enough both in its tare beam and its graduated face scale to cover a reasonably good range of product sizes. Ideally, the face scale should be split in half, one half devoted to conventional symbols such as ½, ¼, etc., and the other to numbering the increments, such as 2, 4, etc. This ties in with the idea mentioned previously of using whole numbers and counting the increments.

The face scale may also be adaptable to graduating one side in 1/32 oz. and the other side in 1/16 oz., or any other combination desired. This is particularly effective when it is desirable to weigh filled weights to one increment and tare weights to another. As to the specific type of scale to use, this depends upon the particular production line set-up, whether it be food, drug, or other products. But whatever type scale is used, it must be fast and accurate, and built to register in the proper increments for the line on which it will be used.

Using Weight Increments

Weighing increments. About 50 samples from one filler head should be taken and weighed to determine the increments in which the product is to be weighed. The test should start at 1/32 oz. for products up to and including one pound; 1/16 oz. for products over one pound, and up to and including three pounds; 1/8 oz. for products over three pounds.

If the weight spread of the 50 samples is between 4 and 10 increments, the increment should be acceptable for test purposes. If less than 4, a smaller increment must be selected; if more than 10, a larger increment should be used. This is done so that a variation in weights will be found, but not so great a variation as to cause

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U.S.I. POLYETHYLENE NEWS

A series for plastics and packaging executives by the makers of PETROTHENE® polyethylene resins

Packaging Notes

Colorful striped polyethylene film makes possible unique package creations. Produced from U.S.I. PETROTHENE resins by a midwest extruder, the film is competitive with printed striped film in price. Unlike printed film, the film with extruded stripes looks equally attractive on both sides. The color will not rub or wear off.

The film is produced generally as a clear film with stripes of any single color. It is also possible to produce two different color stripes or to construct a die to produce alternating stripes on a clear background, or even to obtain a three color effect. Translucency or transparency of the colors can be varied as desired. A raised or embossed effect is also possible. The film is made with standard extruders which have been modified considerably to make possible the fusing of two or three different color streams within the die.

The film is produced as tubing in production thicknesses ranging from 1.25 to 10 mils. It is expected to be used for novelty packaging of candy, cosmetics, stationery, some soft goods, toys, cotton balls and other drug items, and certain foods.

Transfer labeling of poly squeeze bottles is being done at savings of 75% in printing costs by means of a new direct thermal transfer method. The transfer labels are printed on a kraft paper carrier. Heat and pressure applied by a special machine transfers the legend to the squeeze bottle.

The method is said to combine the attractiveness and durability of preprinting with the versatility and economy of labeling. The transfer unit can be mounted on any standard wrapping, bundling or bagmaking machine.

New machine forms and heat-seals polyethylene-coated blanks to produce cartons and trays which are highly resistant to grease and moisture without the need for liners. The machine operates at speeds up to 180 or more units per minute. It is designed for packaging cookies, crackers, fig bars, confections, frozen foods, cosmetics, cigarettes, vegetables and other products.

Poly bag with two compartments separated by a simple polyethylene check valve permits dry premixes to be packaged in ready-to-use form. User simply adds liquid to upper compartment, squeezes it into premix compartment, then wet mixes the ingredients by kneading the bag. Check valve prevents leakage of contents. Products for which the newly patented package design is suggested include cake, pie crust and bread mixes, other wettable formulations such as glues, cements and plaster.

Comprehensive Guide to Polyethylene Processing Completed by U.S.I.; Copies Now Available

100-Page Guide Covers Molding, Extrusion and other Problems

U.S.I. has just released a useful, comprehensive booklet on polyethylene processing. The 100-page booklet "PETROTHENE® Polyethylene . . . A Processing Guide"—is based to a large extent on research carried out by U.S.I.'s scientific staff and experience gathered by its technical service engineers.

Abundantly illustrated, the booklet stresses practical shop information throughout, with only as much basic scientific theory as is needed to make the practical material readily understandable. The booklet discusses polyethylene properties, routine quality control tests and the various techniques for processing polyethylene—film and profile extrusion, extrusion coating of paper and other substrates, wire and cable coating, injection molding, bottle blowing, thermoforming and others, along with related subjects such as heat sealing and film printing.

The booklet is filled with pages of invaluable shop advice for all types of processors. Many paragraphs are devoted to such specific problems as the causes and prevention of wrinkles in blown film, factors affecting the quality and economics of heat sealing, the machine conditions and resin properties which result in minimum "neck-in" and beading in paper coating and the effect of resin type and mold characteristics on cycle time or warpage.

"PETROTHENE® Polyethylene . . . A Processing Guide" is now available free to processors and convertors. For your copy, write to Editor, U.S.I. Polyethylene News, U. S. Industrial Chemicals Co., 99 Park Ave., New York 16, N. Y.

Photo courtesy Mead Board Sales Co.

Corrugating line on which polyethylene-coated corrugated board is now being produced.

Poly-Coated Corrugated Board Now in Commercial Production

Poly-coated corrugated board is now available for the first time. The problem of high temperatures on the corrugator has been avoided by extrusion-coating the liner board at the mill level and using a cold adhesive for corrugating.

Among the applications for corrugated poly-coated containers are:

Bulk shipment of meat, where moisture and grease-proof interiors reduce weight loss of the meat and eliminate loss of container strength through moisture pickup;

Shipment of furniture and other hard goods, where abrasion damage from the container has been a problem;

Bulk bakery and confectionary shipments, where absence of grease-wickage make containers suitable for reuse or use as point of sale displays;

And in concrete construction forms, with the poly coating acting as a release agent.

Tests Show Many Aromatics Can Be Packaged In Poly

A two-year study has shown that a large class of essential oils can be packaged in polyethylene containers with little or no permeability loss.

In this group were such aromatics as Oil Bois de Rose; Oil Cassia Rectified; Oil Citronella Java; Oil Coconut Edible, N. F.; Oil Geranium Algerian; Oil Lignaloe Wood, Mexican; Oil Vertivert Bourbon; Oil Patchouly Penang; Oil Sesame U.S.P.; Oil Ylang Ylang; and Oil Almond Sweet expressed U.S.P.

Cleveland OK's Plastic Pipe

The city of Cleveland has amended its building code to permit the use of plastic pipe for street-to-house water service lines. The decision was made after plastic pipe easily passed rigorous pressure, temperature and torsion tests.

Plastic pipe is considered ideal for street-to-house water lines, which do not involve high pressure or extreme temperatures. It costs half as much as copper tubing and costs less to install.

Air Flow Problems?

U.S.I. Technical Service has a portable air velometer capable of measuring up to 10,000 feet per minute. If you have a problem that might involve air flow, indicate this with your request for technical service so the U.S.I. engineer can have the instrument available when he calls.

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Ship pre-assembly parts? Lightweight paper bags may help cut your freight and packaging costs—prevent product loss. They're doing it every day for manufacturers of items such as fittings, bearings, springs, gaskets—even furniture components.

For example, each bag above, used by the Hayden Manufacturing Company, Evanston, Ill., packs a metal leg for a TV or Hi-Fi set. Bags replace rolls of flat paper tubing, reduce filling and handling time, keep legs from scratching in transit. They also speed opening at the assembler's plant.

Booklet CP-1 shows dozens of different ideas for increasing packaging efficiency with paper bags. One of them might apply to your product. Write for a free copy today.

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extra hardships in observing, recording, and calculating. These increments are suggested as a starting point and should be used only if further testing shows them to be satisfactory.

As an example, assume a product weighing 8 oz. is to be tested. The first 50 samples are weighed to 1/32-oz. increments. Assume that all of these 50 samples fall within ± 1/32 oz. of the desired 8 oz. Then it can be said that the weights of these 50 samples spread out over 2 increments only, or 2/32 oz. Since the spread is too small, the increment should be changed to 1/64 oz. A retest of the same 50 samples, or of 50 different samples, at 1/64 oz. will then give a distribution of ± 2/64 oz., or, in other words, the sample weights will be spread over 4/64 oz., or 4 increments. This 1/64-oz. increment will then be considered acceptable for testing.

In the opposite vein, should the original 50 samples tested at 1/32-oz. increments spread out over ±8/32 oz., or over a total of 16/32 oz. (16 increments), the increment would be too fine, and a retest should be made at 1/16-oz. increments. This second test would then show the samples falling within ± 4/16 oz., or over a spread of 8 increments. Thus, 1/16-oz. increments would be acceptable for further testing. Incidentally, this testing to determine the proper increment can usually be done without recording the data.

Scale setting. Several samples of product should be taken from the filler and placed one at a time on the scale. The package most nearly average should be left on the scale, and the scale adjusted as closely as possible to zero. This is done to eliminate any unnecessary calculations. With the scale set to one of its own increments, the setting is easily read and recorded, and further testing is done with this scale setting as the reference point. The package is removed and the weighing of other packages then proceeds.

Although the product is in a

Product: Coffee — Size: 1-lb. bags

Measurements recorded in 1/32 oz. over or under (—) 1 lb. — Machine No.: 1 — Scale No.: 1

Shift: 1st. — Date: 7/28/58

Series	Time	Measurements in each of 5 items A	B	C	D	E	$\bar{X}$ Average	R Range	Comments
1	8:00	0	1	1	2	1	1.0	2	
2	8:05	0	1	3	—1	—1	0.4	4	
3	8:09	1	2	0	—1	1	0.6	3	
4	8:13	2	0	—1	—1	—1	—0.2	3	
5	8:17	1	2	1	1	2	1.4	1	
6	8:20	0	0	1	0	2	0.6	2	
7	8:25	—1	—1	0	2	0	0.0	3	
8	8:27	1	0	1	2	2	1.2	2	
9	8:30	—1	1	—1	—1	0	—0.4	2	
10	8:35	1	1	0	1	1	0.8	1	
11	8:41	—2	2	—2	1	0	—0.2	4	
12	8:45	2	—1	1	1	0	0.6	3	
13	8:49	—1	2	—1	2	—1	0.2	3	
14	8:54	0	1	0	1	2	0.8	2	
15	9:00	1	—1	0	2	1	0.6	3	
16	9:05	—2	—2	1	1	0	—0.4	3	
17	9:10	2	1	1	1	2	1.4	1	
18	9:14	—1	1	0	1	2	0.6	3	
19	9:17	0	0	0	1	0	0.2	1	
20	9:20	2	—1	0	1	2	0.8	3	
					Total:		10.0	49	
					Average:		0.50	2.45	

$\bar{\bar{X}} = 0.50$ $\bar{R} = 2.45$

$A_2\bar{R} = 0.58 \times 2.45 = 1.42.$

$D_3\bar{R} = 0.$

$D_4\bar{R} = 2.12 \times 2.45 = 5.19.$

Fig. 1. Group sampling record sheet for $\bar{X}$ (average) and R (range) charts. Data was obtained from one ***individually controlled*** filling head during testing to determine its accuracy and establish upper *(UCL)* and lower *(LCL)* control limits. Note that 5 consecutive samples (A-E) were taken from the head at approximately 5-min. intervals.

package, *do not* use a tare package on the tare platform. The error of using one empty container as a tare weight is just as great as using one sample of product to arrive at an average production weight. The scale setting, together with any pertinent information, should be noted on the test sheet.

The next step is to test the empty containers such as jars, cans, lids, bags, etc. This must be done in the same manner and *in the same increment* (1/32 oz., 1/16 oz., etc.) as the finished product. In this way a direct comparison can be made between the finished weights and the tare weights. It should be kept in mind during this testing that it may become necessary to have two scales—one for finished weights and one for tare weights—when the completed system is initiated.

Sample size. Sampling should be done on the basis of five consecutive samples from the filler head being tested. (See Fig. 1) This applies in all cases for machines on which the pockets are individually adjusted. For machines on which two or more pockets are gang adjusted, the number of consecutive samples will be the same as the number of pockets the machine contains.

SAMPLING AND TESTING THE MACHINE

The two most common methods of sampling are:

1. **Group plan.**
2. **Random distribution plan.**

Group Sampling

Individually controlled heads. In group sampling, five *consecutive* samples (considered as one group) are taken from *one* filler head and weighed one at a time on the scale. For each sample, the increment above (+), or below (−), the zero point is recorded as a whole number on the record sheet, Fig. 1. These increments are then totaled and an *average* ($\bar{X}$) of the group is calculated and recorded. From this same group of samples, the *range* (R), that is, the difference between the highest and lowest increment, is also recorded.

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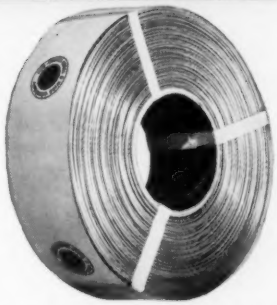

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consecutive samples (another group) are taken from the *same* filler head, and the weighing process is repeated. This procedure is continued until at least 150 individual samples have been taken from the *same* head. Then, the entire process is repeated for *each* filler head on the machine. The time interval between each group of samples should be approximately five minutes.

Statistically, the best number of samples to use is anywhere from four to eight per group. The use of five is strongly recommended because of its inherent ease of calculation—not only for initial testing purposes, but also for ease of installation and use in the weight-control system itself. (When calculating the average for five samples, combine the five numbers, double the total, and point off one decimal place. This is much simpler and faster than dividing the total by five).

Gang-adjusted heads. In the case of a machine with multiple heads which are gang-adjusted, the number of samples in one group should be equal to the number of heads on the machine. For instance, should a machine have eight heads, but only one central adjustment, eight samples (one group) should be taken in the following manner: With the pockets numbered, take eight *consecutive* samples from the line such that the first sample is from number one head, the second from number two head, and so on. These are weighed and recorded as described above. (See Fig. 2).

Care must be taken that only those samples from number one head are listed under number one on the record sheet, etc. The reason for this will be discussed later in this article. Several minutes after the first, a second group is taken in the same manner, etc. The procedure is continued until at least 25 individual samples have been taken from each filler head, which would result in 25 groups from the machine. (See Fig. 2).

Product: Beans — Size: 12-oz. cans
Measurements recorded in ⅛ oz. over or under (—) 12 oz. — Machine No.: 1 — Scale No.: 1 to 8
Shift: 1 st. — Date: 7/28/58

Series	Time	Measurements in each of 8 items A	B	C	D	E	F	G	H	$\bar{X}$ Average	R Range	Comments
1	8:00	1	2	4	0	—1	2	3	1	1.5	5	
2	8:05	0	0	—2	4	5	2	1	1	1.4	7	
3	8:11	—2	1	2	3	2	4	0	4	1.8	6	
= =	= = = =	=	=	=	=	=	=	=	=	= = = =	= = = =	= = = = = =
24	9:57	1	0	2	2	—2	3	4	1	1.4	6	
25	10:02	0	5	1	—1	3	4	0	—1	1.4	6	
Total:		55.0	10.0	52.5	62.5	61.1	65.1	48.3	50.1	40.46	152.5	
Average:		2.2	0.4	2.1	2.5	2.4	2.6	1.9	2.0	1.62	6.1	

$\bar{\bar{X}} =$ 1.62 $\quad \bar{R} =$ 6.1

$A_2\bar{R} = 0.37 \times 6.1 = 2.26$.
$D_3\bar{R} = 0.14 \times 6.1 = 0.85$.
$D_4\bar{R} = 1.86 \times 6.1 = 11.35$.

Fig. 2. Group sampling record sheet for $\bar{X}$ (average) and R (range) charts. Data was obtained from *gang-adjusted* filling heads during testing to determine accuracy and to establish upper *(UCL)* and lower *(LCL)* control limits. Note that 8 samples (A-H) were taken; thus, the number of heads on the machine was 8. Totals and averages of the average and range are conveniently calculated on the sheet.

	n	d	nd	nd^2
	0	4	— —	— —
	1	3	3	9
	20	2	40	80
	33	1	33	33
	24	0	0	0
	18	—1	—18	18
	4	—2	—8	16
	0	—3	— —	— —
Σ:	100		50	156

Measurements: 4 | 3 | 2 | 1 | 0 | —1 | —2 | —3

Note: 0 = 1 lb. in 1/32 oz. increments

Fig. 3. Random-distribution sampling record sheet showing data obtained from one *adjustable* filler head. Variation above or below zero point is recorded as mark under increment category (far right) into which weight has fallen. Measurements in each category are totaled and entered under n (number of samples); values of increment categories are under d (distribution); nd and nd^2 are then determined. (See Equation 4)

Be Sure of Normal Conditions

Precautions. All sampling should be done while the fillers are operating under normal conditions. Any abnormal conditions should be carefully noted on the test sheets. Most filling machines tend to give erratic weights at the beginning and at the end of a run. Therefore, after any shutdown or stoppage, the machine should be allowed to cycle three or four times before any samples are taken. Similarly, care should be taken that no samples are taken just before any given batch of material is exhausted.

During the testing period, no adjustments of the machine should be made, as this will tend to mitigate the value of part of the testing. Should an adjustment become vitally necessary, however, this fact should be carefully noted together with the point in the testing at which it occurred. In later analysis, the adjustment can then be taken into account.

Random Distribution Sampling

In the random distribution sampling, one adjustable filler head is tested by weighing random samples from that particular head and recording their weights into a distribution. One sample at a time is taken from a single filler head and

weighed. The variation above or below the zero point is indicated on the record sheet (Fig. 3) by recording a mark under the increment category into which the weight has fallen. This process is repeated until approximately 150 to 200 weights have been taken.

This type of testing (random distribution) can be used to test gang-adjusted filler heads individually for the average produced or the variation of that particular head. However, for checking one head average against another, it definitely is not recommended. The reason for this is that the time consumed in testing each head allows too much time for the entire machine average to change. And if the machine average changes, the comparison of the average of each head to the others is not valid, and any subsequent adjustments to the individual heads do more harm than good.

The same precautions as listed for group sampling hold true except that if the filler is adjusted to change the average weight, a line should be drawn and a new distribution taken. Any change of average weight during the testing period will tend to spread the distribution out and to distort the true accuracy of the machine.

Choice Of Sampling Plan

For most sampling, the best plan to use is the group method. Calculations of the average and the range will give the same results as calculations of the distribution. However, with this procedure, the time factor becomes an element and trends can be traced chronologically. Gradual changes of filler average, or accuracy, can be noted and perhaps tied to other facets of the process. In general, a better picture of the process can be gained. In addition, the group samples can always be broken down into a distribution, but the distribution cannot be broken up into group samples.

The random distribution method of sampling has advantages in that the data is slightly easier to record and fewer computations are needed. Although this method gives a graphic picture of the machine accuracy, shifts in average will seriously affect its accuracy picture and the time element is lost completely.

The random system should be used only where it is not possible to use the group method. An example of this would be a short, fast production run where speed and volume in weighing and recording are the most important factors.

Unusual conditions. Testing of the fillers in the manner described above establishes their accuracy quite well. It is possible, however, that conditions such as extremes of humidity and/or temperature, etc., could exist at times during normal production use of the filling machine. These might have an appreciable effect on the finished weights in some instances.

If this is so, and these conditions were not present when the tests were first run, the same tests should be duplicated under these other conditions. This is especially necessary after other products and/or different weights have been used on the same machine. However, these duplicate tests can be modified in that fewer groups need be taken—approximately half those taken previously. Also, only a few of the filler heads need be tested to obtain the required data under the various conditions.

Testing Tare Weights

After the finished-weight tests are completed, the tare weight of the container and its variations must be established. This is accomplished in the *same manner* as testing the finished weights. Care must be taken that the tare weights are weighed in the *same increments,* and that the *same sampling method* is used. As a general rule, glass tends to have the greatest amount of variation; paper and paperboard the least; cans somewhere in between.

(Part II of this article appears in our next issue.)

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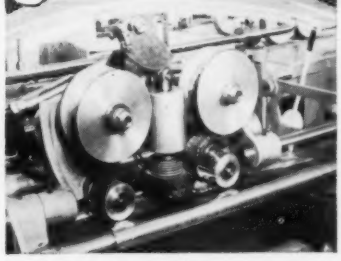

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Here is another "breakthrough zone" of packaging progress: Users now recognize (what suppliers have long known) that it takes product know-how, container technology, and patience to match up product and lining when the container is steel.

Do you know enough about your product to choose the right lining for its container?

A good way of finding the best lining for a given product and container is to look at some of the products being packaged. Some of these represent "questions," and liners for them represent "answers." Among them are chemicals, fatty acids and oils, soaps and detergents, food products, and beverages. Another helpful tack is to look at the types of linings available. These include phenolics, epoxy resins, phenolic-epoxy resins, vinyl resins, and plastisols and organosols – plus various new materials on the packaging horizon. All these deserve close scrutiny.

Effective and satisfactory use of steel shipping containers almost always depends on proper selection and application of a lining. This is especially true in the case of corrosive products. The knack of getting just the right lining to keep the product separated from the bare metal of the container represents an important area of packaging research and technology.

At the same time, this is one of the phases of packaging that is just emerging from the guesswork stage to that of selection on a more scientific basis. One difficulty is that it embraces the full range of industrial protective linings and at times answers to queries are hard to pinpoint. Sometimes one can solve a specific lining selection problem by referring to the prior handling of a similar problem. Lacking such information, a researcher must develop his own data.

While the primary function of a lining is to protect the product rather than to preserve the container, it often happens that it attains its primary objective by protecting the container itself. Steel rusts rather quickly, especially under corrosive conditions. Getting the correct lining frequently depends on knowing enough about the product itself.

WHAT LINING TO USE?

Chemicals

Experts in linings are quick to point out that full and detailed knowledge of the product being packaged is necessary. For example, the pH (effective acidity or alkalinity) is often the paramount factor for a water base product. For non-aqueous solutions, it is helpful to know what organic solvents are used in making the product.

Chemical products illustrate the range of packaging in steel containers. Under "chemicals" are such materials as acetic and hydrochloric acids, organic compounds such as diethylene glycol and glycerine, and salts such as ammonium nitrate or ferric chloride.

A lining must protect these products from contamination by rust or other foreign matter. Many of the more active compounds react with the metal container unless there is an adequate protective lining as a barrier between metal and product. Chemical nature of the product itself usually governs the choice of lining.

Experience shows that pigmented phenolics generally give good protection for acidic materials. On the other hand, epon-phenolics are most suitable (and more adherent to the base material) for milder acid and alkaline materials. The new plastisol and organosol linings are becoming more important because they can be applied as heavy coatings without loss of flexibility or adhesion. *(Turn Page)*

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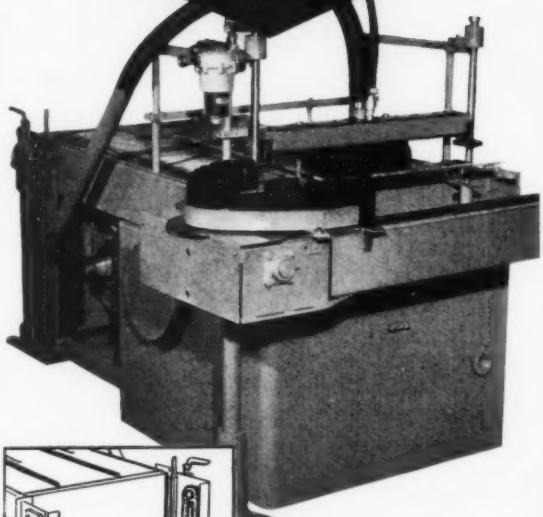

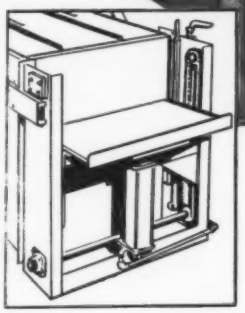

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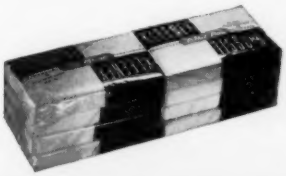

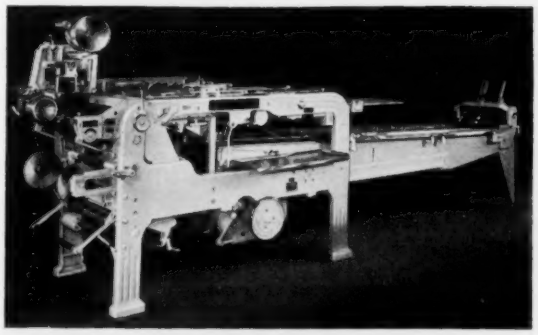

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Containers lined with plastisol can hold many acid materials. Its flexibility is notable. This is important because the lining remains intact and functional even when a container becomes severely dented.

Fatty Acids And Oils

Another product area includes fatty acids and oils. Container lining experts warn against underestimating the importance of carefully protecting fatty acids and oils. They point out that materials such as castor and linseed oil and their fatty acid derivatives often are ingredients going into other products. Any impurities they acquire will survive normal processing operations. Thus, they remain as contaminants in finished products.

Because of this, many specialists urge the same care be used in packaging them as in packaging ready-to-eat food items. A clear phenolic lining is usually sufficient for such oils as castor and linseed, but many fatty acids and their derivatives from these oils are substantially more potent. They require either a double coat of clear phenolic lining, or a pigmented phenolic lining. To a lesser extent, vinyl and oleoresinous lacquer linings go into containers used for these products. Incidentally, the experts warn that unless discoloration is prevented, it shows up in the final product.

Soaps And Detergents

The third major category includes soaps, detergents, and cleaning agents. A packaging point of caution is that the powerful wetting action of the common detergents and cleaning agents greatly increases opportunity for corrosion from these materials. Further, any lining for a container of these products must resist such action for long periods of time—after the container has been opened. Such products are vulnerable to discoloration in event of rusting of the container due to lining failure.

There are four main classes of detergents or "surface active" agents, as they often are called:

1. Anionic surface active agents. In these the hydrocarbon group is part of the negatively charged ion when the compound ionizes.

2. Cationic surface active agents. In these the hydrocarbon group is part of the positively charged ion-when the compound ionizes.

3. Non-ionic surface active agents. These dissolve without ionization.

4. Ampholytic surface active agents. These are the Zwitterions and can exhibit either cationic or anionic activity, depending on the pH of the media.

Differences in the chemical action of products included here demand that the packaging requirements of each material be considered as a separate problem. As a result, it is necessary to choose a lining according to specific requirements. For example, linings recommended for detergents and soaps may come from the groups of phenolics, epon-phenolics, and epons, depending on what is be-

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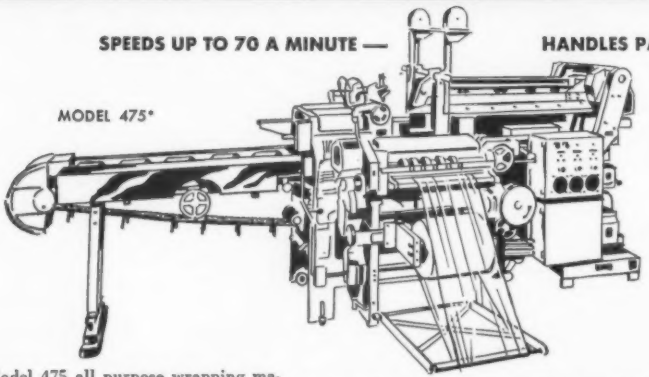

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ing packaged. Lining specialists warn that a two-coat system is often advisable for the more corrosive detergents.

Food Products, Beverages

Food products and beverages are another category. Here a special problem is that quality controls necessary to meet sanitary requirements often are paramount. Interior linings containing toxic pigments or soluble constituents cannot be used with food products. Container research experts point out that there must be no direct contact of food products with bare spots in a metal container. Such a reaction might cause serious contamination of the product packaged and could endanger the health of the ultimate recipient.

The main factor affecting the extent of attack at any pinholes in the lining is the pH or effective acidity of the product. pH values below 7 are on the acid side. These are typical of fruit products. A pH of 3 represents a solution 10 times as strongly acid as a pH of 4. Similarly, a pH of 4 is 10 times as acid as a pH of 5.

This makes it evident that any material having a pH of 2 (such as many citrus products have) would require an assured lining of a pigmented phenolic or epoxy phenolic lacquer. Further, to assure acceptance of the food product itself, there must be no unpleasant odors or tastes absorbed from the lining material. To this end, phenolics and epon-phenolics are most commonly used as protective linings. However, oleoresinous and vinyl-type linings are also used for certain neutral products in this class.

Just as do foods, beverages run the gamut of lining requirements. For example, apple cider, honey, and molasses may be packaged in containers having a clear phenolic lining. On the other hand, beverages such as cola and root beer concentrates require a lining of the most resistant pigmented phenolic lacquers.

Other products, too, present lining problems and needs. These include such items as solvents, paints, paint raw materials, adhesives, and petroleum products. They require protection against contamination and discoloration. These materials may be contaminated by water, rust, or foreign matter. In each case, the lining formulation depends on the special properties and susceptibility of the product.

Experts point out that phenolics, pigmented or clear, usually are satisfactory for containers holding solvents. Phenolic, vinyl, or oleoresinous linings are suitable for petroleum products. Containers for oil paints often are lined with merely a rust inhibitor to prevent rusting before use. This is sufficient because oil paints are non-corrosive to steel containers.

However, polyvinyl acetate paints and adhesives are usually packaged in containers lined with either a phenolic or epon-phenolic material. And for the more corrosive products, multiple-coat systems may be necessary for best results.

Types Of Linings

There are many resin types such as phenolic, epoxy, etc. Both clear and pigmented linings are available. Specialists note that while clear linings provide an attractive finish, they usually are not as corrosion resistant as the corresponding pigmented linings. There are two reasons for this:

1. Pigmented linings are generally applied 50 per cent heavier than corresponding clear linings.

2. Presence of pigment decreases the moisture permeability of the lining film. Chemical reactivity of pigment lowers moisture permeability.

A quick look at the properties of some typical lining materials may prove helpful as a basis for selection.

Phenolics. Phenolic linings are among the most corrosion resistant materials available. However, unmodified phenolic linings are quite brittle and usually require certain

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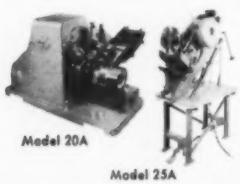

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additives to improve adhesion and flexibility. Phenolic linings baked below 300°F. generally are water white and reasonably flexible. As baking temperature increases to 400°F., color of the lining darkens from straw to a clear golden brown. While the lining becomes more corrosion resistant as this happens, its brittleness and lack of adhesion also increase. Reason for this change is that the heat converts or joins the suspended resin particles into a molecular union producing a film progressively more unreactive.

Epoxy resin. Epoxy (or epon) resin linings are usually quite flexible and are noted for their alkaline resistance, container experts point out. Normal practice is to bake epoxy linings 25° to 50°F. higher than phenolic linings. Chemical resistance of the lining improves as baking temperature increases. However, if baking temperature becomes excessive, there is a yellowing of the lining.

Specialists point out that where baking facilities are not available, epoxy linings may be cured through use of catalysts such as phosphoric acid or organic amines. Linings cured with catalysts generally do not have as high a chemical resistance as baked linings.

Phenolic-epoxy resins. Linings from this combination have many of the desirable characteristics of each of the constituent resins. A major reason for combining these resins is to improve the flexibility and adhesion of the otherwise desirable phenolic resins. Experts point out that the relative percentage of phenolic and epoxy determines the degree of change in characteristics.

Vinyl resins. Vinyl resin solution linings, pigmented and unpigmented, have been used many years. Typical applications of them include the packaging of various alkaline and near neutral materials. In recent years, interest in vinyl resins has increased considerably through their use as dispersion coatings.

Plastisols and organosols. These

are dispersions of powdered vinyl resins and a balanced combination of plasticizers and stabilizers. By varying the ratio and type of plasticizer used, there may be considerable variation in the properties of the plastisol obtained. Baking temperatures vary from room temperature to about 365°F. A primer is usually necessary to get good adhesion. Pure plastisols generally are white, but may be colored without impairing their resistance.

New resin materials. Container lining specialists say that fluorocarbon resin coatings have excellent corrosion resistance, but their present high cost precludes their use in many applications. Urethane resin system coatings represent a promising recent development. Experts anticipate good adhesion and corrosion resistance with them. Their cost is comparable to other high-bake lacquers.

Container linings often include waxes to supplement many corrosion resistant lacquers. Typical of these is a microcrystalline wax having excellent adhesion to almost any clean surface. Further, the corrosion resistance of this wax may be improved through additions of polyethylene. Doing this, however, detracts from flexibility and adhesion. Further, it can be done only in limited percentages. Waxes may be applied by flow-coating parts of the surface as required, or by spraying or flushing the entire surface of the container lining.

Look at other factors, too, when choosing a lining

Experts urge attention to dispensing of product, provision for pouring, effect of product corrosivity, importance of proper filling, and clean conditions—and care in choice and use of container gasket.

Furnishing adequate product protection when using a steel container involves more than merely getting the most suitable lining. In spite of the importance of the lining, (as suggested by the accompanying article), other factors deserve attention. Experts stress the importance of care in choosing the container, getting a proper closure, maintaining correct filling conditions, and using proper gaskets.

Basically, knowledge of the chemical properties of the product aid in selecting the right container. Density of unit weight of the product determines the gauge of metal to use. Gauge requirements are covered by military and other federal specifications, and Interstate Commerce Commission or Consolidated Freight Classification requirements.

A desired method of dispensing a product governs the closure, including provision for pouring if any. Corrosiveness of the product itself determines the lining required, as described in the accompanying article on linings. Solvent base of the product is the principal determining factor in choosing the correct gasket.

For a corrosive material, a plastic spout may be the best choice. Occurrence of failure around the seams of the container and along the edge around the spout may suggest coating the seams and inside circumference of the spout opening with a microcrystalline wax. This has good adhesion to both the spout and the surrounding coated edge.

Where highly corrosive materials are involved, a reversible plastic spout may prove most practicable. Viscosity of product may govern the size used. Pour-spout fittings used in container covers require just as careful lacquering as the containers themselves.

Watch Filling Conditions

Steel container experts point out the importance of maintaining adequate sanitation before and during the packaging operation. For example, some package users may neglect the elementary requirement of filling containers as soon as possible after removing their covers. Filling equipment must be kept scrupulously clean between filling operations. Failure to clean up adequately from day to day may enable quantities of bacteria to enter the containers, thus resulting in spoilage.

Further, the product being packaged must be prevented from spilling on the outside of the container or its edge. Product spilled on a top edge or on a gasket in a cover frequently interferes with sealing. This results either in leakage of the product or breathing of air through the leak, thus resulting in more spoilage.

Typical gaskets for such containers are either of the flowed rubber emulsion type or are molded tubular rubber gaskets. A study of the action of the product on the different types of gasket material governs the choice. It is important to get the most desirable combination of gasket and cement to hold it in place. This, too, is determined by checking the action of the product on it. Usually the solvent base determines whether the product will affect a gasket. *(End)*

Announcements of machinery and products

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Barrier Film

Minnesota Mining & Mfg. Co. announces a new barrier material in its Scotchpak line. Made of tough heat-sealable polyester film which has been vacuum metallized and bonded to a backing of scrim, this new film meets military packaging specification MIL-B-131C Class 1; its seal strength and water and oil resistance meets MIL - B - 117A, and its seam strength test meets conditions of MIL-B-131C and 116C. Additional properties of this material are that it is thinner than the foil laminates, has much greater flex strength, and will not pinhole easily. Circle No. 1.

High-Speed Filling

Frazier & Son has designed another in its line of Whiz-Packer units, a high-speed filling machine which attains up to 300 fillings /min. The Model P unit is an 18-pocket, fully automatic, volumetric filling machine engineered to handle a variety of dry products, ranging from fine powders to granular and bulk materials. Model P is powered by two ¾ hp motors and has a no can-no fill device. Circle No. 2.

Thermoplastic Adhesive

B. F. Goodrich Industrial Products Co. has developed a new rubber-like adhesive, known as A-916-B, now available as a laminating adhesive. The molecular structure of this new material is said to be very different from that of other rubber-like cements. It is described as a polymer with built-in adhesive characteristics. Type A-916-B bonds synthetic films to metals, paper, wood, glass, plaster, and other materials without heat or special surface treatment, Goodrich says. It can be applied by brush, roller, or knife, or can be modified for a spray. Circle No. 3.

Plastic, Glass Bottle Sorter

Chase Mfg. Co. has a new bottle sorting machine to handle plastic and glass containers and vials. In operation, bottles are delivered in a line from a vibratory hopper. An air-operated device receives the bottles either neck or bottom first and readjusts to deposit them all bottom down. This action is claimed to be positive and not dependent upon weight distibution in the bottles. Each stroke of the unit delivers one bottle, with production speeds of over 60/min. An electrically-operated valve controls the air cylinder, permitting the sorter to be tied directly into filling and other machine operations. Circle No. 4.

Shrinkable Transparent Film

The Dobeckmun Co. has developed a shrinkable, transparent film for packaging fresh frozen poultry, fish, cured and processed meats and cheeses. Called Saran Wrap-S, the high-shrink film is said to have low temperature flexibility and improved transparency. To package with Saran Wrap-S, the product is placed in the shrinkable bag or tube, a vacuum is drawn, and the package is clip sealed. The filled package is then briefly exposed to heat from steam, hot air, or hot water. This shrinks Saran Wrap-S evenly around the product and makes a skin-tight package. Circle No. 5.

Soft Products Packaging

Laukhuff-Pratt Mfg. Co. announces an automatic wrapping machine for packaging soft, flimsy products. No stiffener is required. The machine automatically folds and seals products in glassine or foil roll stock. It is equipped to count and stack finished pieces and is available with or without printing register. A printer can also be supplied. In an operation involving packaging surgical sponges in glassine, the machine attained a speed of 60 sponges/min. Varying speeds are obtainable, depending on product. Circle No. 6.

Removable Coupon For Fibre Can

Milprint, Inc., has designed a removable coupon specially for use on fibre cans. A release spot, formed by coating the portion of the label under the coupon, is printed in register with the coupon copy. The release spot prevents glue from adhering to that portion of the label during the labeling operation. The coupon is printed on an opaque unlacquered area which provides a surface that can be written on. Circle No. 7.

Low Static Styrenes

Monsanto Chemical Co. has developed two low static styrenes, Lustrex Lo-Stat 22 and Lustrex Lo-Stat 29, that can be injection molded into products having virtually no attraction for dust particles. The new materials practically eliminate the electrostatic fields which attact dust and hold it on the surfaces of molded pieces. The materials are so formulated that the molded surfaces are sufficiently conductive to allow most of the positive and negative charges to neutralize one another. Type 22 is a standard molding grade and type 29 is a formulation with improved heat resistance. Both materials are ideally suited for such applications as package closures. Circle No. 8.

New Interior Packaging Method

Ned L. Roberts, Inc., announces a new concept in interior packaging. Called "Poly-tite" packaging, the process offers protection to the packaged item by encasing it in a tight-fitting transparent film of polyethylene plastic which is simultaneously bonded to a poly-coated corrugated mounting board. The board, when folded along scored lines, may be inserted into an outer sleeve of corrugated board for shipping. Circle No. 9.

Soft Drink Carrier Board

Continental Can Co.'s boxboard and folding carton div. has a white lined kraft cylinder board with wet strength additives for use as soft drink carriers. With the grain of the sheet running the length of the carrier and the cross grain running the height of the carrier, the white lined kraft provides all the tear strength needed in the pull direction. The new board is said to retain its strength and natural shape even after the most severe soaking. Circle No. 10.

Industry literature available free

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Edge Seal Closures

Amsco Packaging Machinery, Inc., has literature available on its Amscomatic 100. This machine automatically seals polyethylene, cellophane, and laminated film bags at speeds up to 1,000 linear in./min. As the seal is made, the machine simultaneously removes and disposes of the skirt or lip above the seal. It operates on both soft and rigid goods and if desirable can seal very close to the contents of the bag. Circle No. **101.**

Package Sterilization

Wilmot Castle Co. is offering a twelve-page brochure outlining its complete program on package sterilization. Types covered are steam, dry heat, and the relatively new medium of gas sterilization by inerted ethylene oxide. In addition to discussing how they research a product and package, engineer procedures and direct installations, they also list a number of products normally requiring sterilization and the method generally recommended. Circle No. **102.**

Laminated Textile Shipping Sacks

Chase Bag Co. offers a 16-page booklet on its "Job Engineered" laminated shipping sacks. These sacks are designed specifically to package a particular product and are especially adaptable when products are alkaline, acidic, hydroscopic, deliquescent, abrasive, or contain grease or oil. A number of materials and design methods are discussed and illustrated. Circle No. **103.**

Adhesive For Steel/Aluminum

H. B. Fuller Co. has released technical bulletin RTB-18A in which its new adhesive, Resiweld No. 105, is described. This epoxy-based adhesive is said to produce bonds of over 5,000 lbs. p.s.i. on aluminum and steel. It comes ready to use and hardens permanently when cured with heat at 350° F. for 25 to 40 minutes. The thick, liquid, metallic colored adhesive can be applied to metals and heat resistant non-metals by brush, trowel, caulking gun, or pressure feed systems. Bonds formed are said to be resistant to moisture, water, temperature changes, solvents, and most chemicals. Circle No. **104.**

Pressure-Sensitive Paper Tape

Shuford Mills, Inc., offers literature on a variety of paper-backed pressure-sensitive tapes which are available in a complete range of widths. The line includes transparent tape, freezer or locker tape for sealing kraft, film, or board containers, and colored tape available in white and five colors. Circle No. **105.**

Foil-Lined Multiwall Bags

Aluminum Co. of America offers a 4-page brochure describing the advantages of foil-lined multiwall bags. These bulk packages for chemicals, foods, and pharmaceuticals provide a good moisture, gas, grease, and odor barrier, and offer a savings in initial cost and handling, Alcoa says. Specifications for these bags are included. Circle No. **106.**

Can Case Packer

Burt Machine Co. has issued a brochure outlining the advantages of Model "PCE" case packer for cans. It is said to reduce handpacking labor costs by two-thirds, and features greater magazine storage and an anti-jam mechanism. Unit is mounted on casters. Circle No. **107.**

Peelable Protective Coatings

Bischoff Chemical Corp. offers a four-page illustrated bulletin describing ThermoCote. It provides hermetically sealed protection against rust, abrasion, and corrosion for metal parts and tools. It is applied quickly, has high clarity, and is reusable. Circle No. **108.**

Semi-Automatic Cappers

W. H. Swanson & Co. has Bulletin No. 56 in which its semi-automatic capping equipment is described. One machine handles any style or shape of plastic or metal screw type cap up to 145 mm. size. Another type handles friction caps. Circle No. **109.**

High-Speed Batch Control

Hoover Electronics Co. has released Application Bulletin No. 4 describing its indicator controller for use in high-speed batching operations. Device will dispense predetermined portions of liquids, solids, or combinations of both. Portions may be pre-set by manufacturer or readjusted for different products by user. Currently used for blending aromatics, pharmaceuticals, coffee, flour, etc. Circle No. **110.**

Paper Bag Applications

Union Bag-Camp Paper Corp.'s Commercial Packaging Dept. manufactures custom-made paper bags for a wide variety of industrial uses. A current thought-provoking brochure illustrates some interesting applications for which these bags have been used. Some such uses include ice cream, machine parts, chemicals, ice, plastic curtains, etc. Circle No. **111.**

Multiwall Bag Closer And Sealer

International Paper Co., Bagpak Div., lists the advantage of the Model DA bag packer in a brochure that includes specifications and dimensional sketches. This machine applies a closure to multiwall bags which is proof against sifting, contamination, infestation, and moisture. It is recommended for packaging high-priced products such as hygroscopic chemicals, plastics, flour, food products, insecticides, and fungicides. It is mounted on casters for easy portability. Circle No. **112.**

Weighing And Filling Machine

The Trescott Co., Inc., has a bulletin on the Trescomatic machine, which is adaptable for weighing and filling any dry, free, or semi-free flowing material, including food, drug, chemical, and hardware products. Any type container may be used in weights from 8 oz. to 25 lbs. Weights and products can be changed rapidly. The bulletin is illustrated and contains specifications. Circle No. **113.**

Reinforced Sealing Tape

General Gummed Products, Inc., lists the advantages of Glaret fibre-reinforced sealing tape in a current information folder. This gummed tape is two-way reinforced, both across and along the tape length permitting single-strip sealing. Tape can be applied by hand or automatic machines. Circle No. **114.**

Polyethylene Drums

Delaware Barrel and Drum Co., Inc., manufactures molded polyethylene drums that are thoroughly described with pictures and specifications in a file folder jacket containing data sheets. These drums are available in 5-gal., 15-gal., 30-gal., and 55-gal. sizes. They have been tailored to fit into standard steel drums, pails, or corrugated cartons. They are ICC approved, non-toxic, chemical resistant, and reusable. Circle No. **115.**

Automatic Vial Filler-Capper

Arenco Machine Co. has complete information on its Capsolut Cartrix unit for feeding, capping, and sealing small bottles and vials. Vials are fed to a rotary carrier from the magazine at synchronized speeds. A first filling of about 50% of container volume and a main fill at which the remaining air is forced out of the container prevents air bubbles from accumulating. Seals are sorted and fed from a vibrator through a feed slide and are positioned on containers. A spinning

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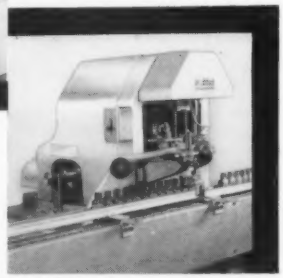

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mechanism with adjustable piston and spinner pressure seals the containers. Circle No. **116.**

Dehydrated Military Packages

Culligan, Inc., has a 20-page product catalog on its dessicants and humidity indicators for dehydrated packaging. Humidity indicator cards and plugs are illustrated for use with both flexible and rigid reusable containers. Approval under various military packaging specifications is indicated for each product. Circle No. **117.**

Poly-Lined Fibre Drums

Armour & Co. has available a folder which contains complete handling instructions for lightweight, polyethylene-lined fibre drums, a development of the Fibre Drum & Corrugated Box Div. of Continental Can Co. The drums may be used for packaging such products as shortening and lard. The drums feature a lever-locking system which simplifies opening and permits tighter reclosure. Circle No. **118.**

Gummed Label Stocks

Mid-States Gummed Paper Div. offers a copy of a sample book which illustrates its complete line of 35 flat, colored gummed stocks. Included in the line are M.F., coated, plated, Imperial, friction glazed, Day-Glo, and Boncraft grades. Basis weights available range from 45 lb. M.F. mediums to 120 lb. Day-Glo. Circle No. **119.**

Multiple Packeting Liquids/Powders

Brown Filling Machine Co. has an 8-page brochure describing its multiple Packeter. 25 to 50 cycles/min. and up to 8 packets/cycle are possible for liquids, powders, or a combination of both. One feature incorporated into the liquid packeter is "reverse vacuum engineering." Circle No. **120.**

Package Testing Machinery

Testing Machines, Inc., has available a folder containing bulletins of all the testing machines they manufacture and distribute. These number in the hundreds and include impact, stress and strain, compression, and crush testing machines among others. Prevailing prices are included. Circle No. **121.**

Cold Seal Automatic Packaging

Conapac Corp. has released a data sheet on its Roto Wrap Model 500 for the automatic packaging of objects by cold seals using self-adhering kraft paper rolls. A continuous motion unit, the Model 500 makes, fills, and seals containers, operating from rolls of printed or unprinted stock. Speeds up to 200 packages/min. have been attained. The machine forms packages in widths from 2" to 6", lengths from 4" to 15', and handles products up to 2" in height. Circle No. **122.**

Taping & Labeling Equipment

Better Packages, Inc., has Catalog #107 available fully describing 58 models of both its sealers and Counterboy line of taping and labeling equipment. Specifications and prices are included. Circle No. **123.**

Flexible Packaging Machinery

Mercury Heat Sealing Equipment Co. offers a 6-page gate-fold illustrated brochure that describes its line of filling and sealing machines which handle flexible packaging materials. Units include a form-fill-seal machine, a strip packager, drum liner, a pouch maker-sealer, a saddle label sealer, as well as foot-operated and hand-operated sealing machines. Circle No. **124.**

Portable Desiccant Container

D. C. Cooper Co. has literature on its portable desiccant containers for storage of desiccants and silica gel (moisture absorbents). The containers are divided into sections for various size bags and are equipped with heavy casters for easy portability to various packaging jobs. Lids are equipped with hygrometer to indicate the relative humidity in the desiccant container. A portable electric drying lamp is provided for drying moisture in the units. Circle No. **125.**

Light Stapling Hammer

Bostitch has introduced a stapling hammer, Model H5, for light tacking jobs. The hammer is light in weight but heavy enough to deliver good driving force, Bostitch says. It loads with a strip of 157 staples of .025" round steel wire, using 3/16", 1/4", and 5/16" staple leg lengths interchangeably. It was designed for tacking soft materials and many hard woods. Circle No. **126.**

Industrial & Specialty Tissues

The Crystal Tissue Co. offers a complete fact file with sample swatches of basic tissue types which are available for industrial, converting, and specialty applications. Outlines, describes, and illustrates the special characteristics of each type of tissue. Explains how new tissues are developed for special requirements, and provides lists of examples of standard and unusual uses. The file is punched to fit a 3-hole notebook. Circle No. **127.**

Translucent Film Adhesive

Angier Adhesives has data on its "Double-Face" pressure-sensitive translucent film adhesive. "Double-Face" is said to be useful for laminating to open and closed-cell foam materials such as vinyl foam, polyurethane foam, polyester foam, and rubber foam. The adhesive is reinforced by a non-woven tissue which prevents excessive penetration. Circle No. **128.**

Stamping Equipment

Olsenmark Corp. has a brochure on its Kensol lightweight roll leaf stamping equipment. The folder contains photographs and specifications for the Kensol 15 hand-operated press, the Kensol 15T air-operated press, and the Kensol 15T air-operated "power pack" model. All machines feature an imprinting area of 2" x 4", and are designed for hot stamping imprints on such materials as plastic, leather, paper, cloth, wood, etc. Imprints up to 1,000/hr. are attainable. Circle No. **129.**

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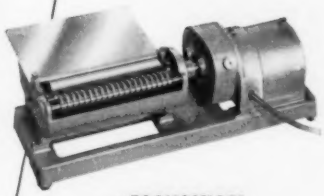

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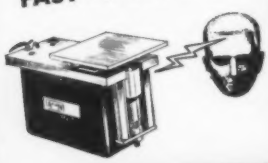

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leased a catalog of its line of tape dispensers. Recently introduced is a feather-touch feed, manual-type tape dispenser that will handle any size tape from 1" to 4" wide. It features a subway feed, patented tape guides on the cutting strap, aluminum water box, and bristle brushes. Circle No. **130.**

Humidity Indicator

Humidial Co. is making available samples of its plastic humidity indicator consisting of small bars within a plastic stip. Each plastic bar changes color from blue to pink at a given humidity (within plus or minus 5%), so that it can be read like a thermometer at the top of the pink bars. The indicator is said to be accurate in the range from 30% to 80% humidity. Circle No. **131.**

Short Case Sealers

A-B-C Packaging Machine Corp. manufactures a very short and compact corrugated case sealer designated as Model XSA, which is described in a four-page brochure with photographs and mechanical drawings. This sealer is adjustable to a wide range of box sizes and offers optional features such as strip gluing, a case counter, serial numbering head, etc. Circle No. **132.**

Corrosive Chemicals Container

Jones & Laughlin Steel Corp., Container Div., has released a pamphlet describing the JalBoy plastic and steel returnable container for use in shipping and storing corrosive chemicals. The JalBoy consists of a polyethylene bottle enclosed in a steel drum. Three sizes are available: 13-gal. heavy duty; 14-gal. standard, and 5-gal. standard. Circle No. **133.**

Height-Of-Fill Monitor

General Electric Co. has a 4-page folder, No. 3441A, describing its Hytafill X-ray inspection device for automatic high speed monitoring of height-of-fill in sealed opaque containers. Inspects up to 900 containers/min. and can detect 1/32" variations in underfill or overfill. Circle No. **134.**

Glass Container Rinser

Standard-Knapp, Div. Emhart Mfg. Co., offers Bulletin 68-3 which illustrates and describes the operating features of its rinser. The machine operates at high speeds and is used for rinsing new bottles or jars with hot water. Containers are then drained and discharged to a conveyor ready for immediate handling in the packaging equipment. Detailed mechanical drawings are included. Circle No. **135.**

Packaging Machinery

Stokes & Smith Co. offers Bulletin P-806 which describes a variety of its packaging machinery. Pictures and specifications for this equipment are listed, including data on pillow and fin-seal package making and filling machines, a filler for granules, powders, or pastes, a carton maker-liner-filler, a carton filling and sealing machine, and a Stretchrap packaging machine which contour wraps irregularly-shaped products in Pliofilm. Circle No. **136.**

Automatic Candy Wrapper

Supermatic Packaging Corp. has a new bulletin on the Supermatic 5000. The machine automatically fold-wraps single square candies, groups them into packets of 5, 10, or 15, then wraps the packet with three-sided heat seals. This unit makes up to 400 single square wraps/min., using any type roll fed wrapping material. Circle No. **137.**

Vacuum Filler

Machinery Service Co. has a brochure that lists various features of the M-S rotary vacuum filler. Available in 12, 18, or 24 filling tube models, the unit is designed for high-speed filling of any free flowing liquids, light or heavy, foamy or syrupy. Circle No. **138.**

Bundling In Cellophane

Olin Mathieson Chemical Corp., Film Div., offers an interesting bulletin which outlines the many cost savings made possible by bundling multiple packages in cellophane. Suggested basic bundling arrangements are for different shaped packages such as tall, flat, round, and irregularly-shaped objects. An estimate work sheet that can be used to compare present costs with the cost of bundling is provided. After the necessary basic information is filled in, Olin Mathieson will prepare the cost estimate comparison for you. Circle No. **139.**

Multiwall Foil Bags

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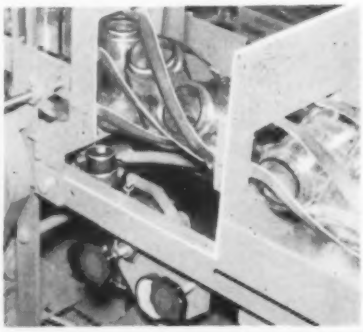

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chure entitled "Multi-Wall Foil Bags," which describes how multi-wall aluminum foil bags are now being used for bulk shipment of such products as hygroscopic or deliquescent materials, moist pastes, corrosive chemicals, oily products, gaseous compounds, caustics, and alkaline products. The foil is laminated either inside, outside, or between the two layers of paper in a two-ply kraft bag, depending upon the requirements of a specific product. Circle No. **140.**

Polyethylene-Wax Coatings

Semet-Solvay Petrochemical Div., Allied Chemical Corp., has released a technical data bulletin, "Low Molecular Weight Polyethylene-Wax Coatings for Corrugated Board." This type of polyethylene when blended with paraffin wax and applied to corrugated board improves scuff resistance, grease resistance, and release properties. The bulletin describes the characteristics of polyethylene-blended coatings, enumerating the results of numerous tests for hardness, blocking point, chemical resistance, etc., graphically demonstrating the results with charts. Circle No. **141.**

Rust Inhibitor Paper

The Cromwell Paper Co. has Technical Bulletin No. 655 which explains the characteristics and uses of "Ferro-Pak." This is a rust-inhibitor paper impregnated with a chemical that retards the corrosion of iron and steel parts due to moisture and oxygen. It is made to conform to MIL-P-3420. Offering protection of from 6 to 12 months in indoor storage, this paper may be corrugated or can be applied to cellulose wadding or to moldable materials; it is also available in bags, pouches, or sacks. Ferrous metal parts and machines can best utilize this material as a packaging component. Circle No. **142.**

Packaging Adhesives

Arabol Mfg. Co. has a booklet entitled "How to Buy Adhesives for Better Adhesion," which offers 23 basic yardsticks for selecting the right adhesive for a particular application. It points out such factors to be considered when selecting an adhesive as the material being used, the length of time an adhesive must "stick," conditions such as dry heat, dry cold, moisture, etc., with which the product may come into contact, how the adhesive is to be applied, and so on. Circle No. **143.**

Plastic Films

Celanese Corp. of America has published a booklet, "Plastic Films—Acetate—Polyethylene." It describes these materials in detail by type available, their characteristics, and applications. Included are tables showing mechanical properties and gas and water vapor transmission rates. Circle No. **144.**

Packaging Machinery Catalog

Wright Machinery Co. describes its diverse line of equipment in a 24-page catalog. Well illustrated, it gives standard specifications for weighers and fillers of dry, free flowing products for cartons and bags, as well as cracker sandwich wrappers, and a liquor bottle strip stamp machine. Circle No. **145.**

Three-part packaging system pays off

(*Continued from Page 36*)

the needs of our company. For us the single-sheet packaging requirements form is the most advantageous vehicle for our system. It provides a flexible method that insures standardized, simplified, and economical packages that adequately protect the parts. Certainly the degree of proficiency of the personnel using the form contributes much to its success.

Our system is much like a tripod. If a tripod has only two legs, it will fall. The three "legs" of our system are the packaging requirements form, the "working" departments, and the information sources. (*End*)

Additional copies of this article may be obtained from us upon request to our Reader Service Department, at our Chicago office, 185 North Wabash Avenue.

WHIZ-LIFTER

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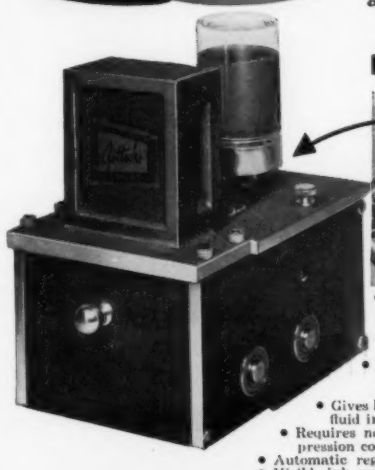

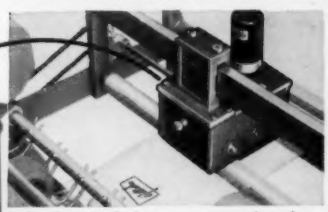

- Easily attached to any wrapping, bundling, bag-making machine. Compact — weighs less than 5 lbs.
- Functionally designed for trouble-free operation.
- Imprints code-dates, descriptive copy, trademarks on paper, cellophane, polyethylene, glassine, foil, etc.
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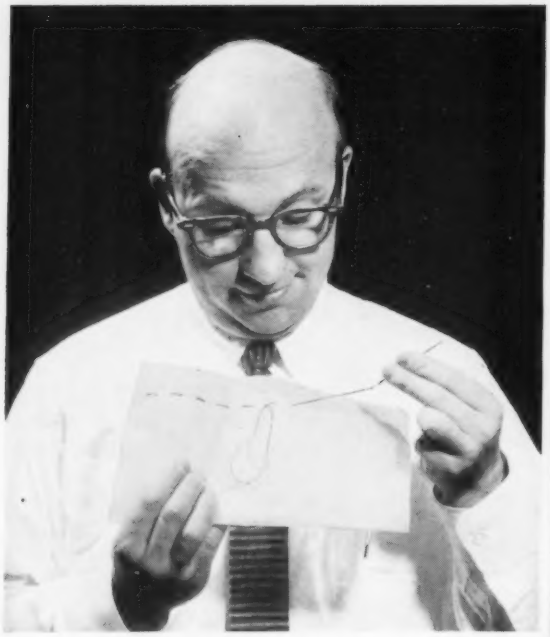

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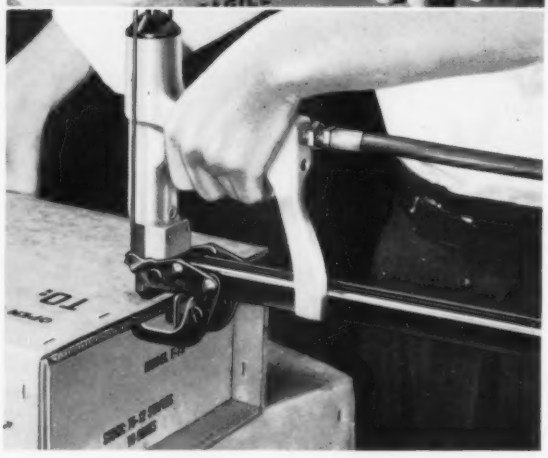

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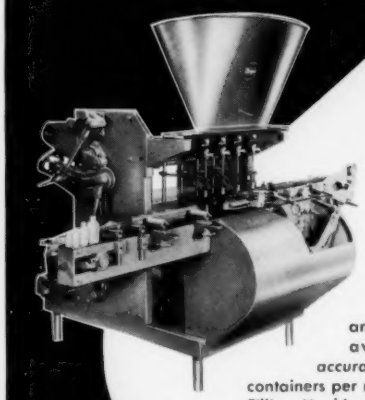

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CLASSIFIED ADVERTISING

Our classified advertising section is intended for use by those wishing to buy or sell used packaging equipment, to employ packaging personnel, seek such employment, offer or seek business opportunities. It is not available for general advertising. Terms: Cash with order. Rates: Up to 60 words, $10.00. If boxed, $20.00. Over 60 words, $40.00 per column inch.

POSITIONS AVAILABLE

Distributors Wanted—Leading manufacturer of conveyors, and packaging machinery interested in establishing distributors in principal cities. Submit resume of lines now handled, plus organization operation to Box 1102, **Package Engineering**, 185 N. Wabash Avenue, Chicago 1, Illinois.

Representatives Wanted—To handle line of tanks for heating tar, pitch, asphalt, wax, and plastic, dip tanks for metal parts cleaning, etc., U/L approved. Established accts. Good commission. D. C. Cooper Co., 1467 S. Michigan Ave., Chicago 5, Illinois. Telephone: HA-7-8046.

Chief Engineer Wanted—Excellent opportunity with fast growing multiplant packaging material company for aggressive engineer to handle plant, quality control, and customer machines in Chicago plant. ME degree and 3 years film, foil, or paper converting experience required. For consideration, submit detailed resume including salary requirements. Our employees know of this position. Please reply to Box 1101, **Package Engineering**, 185 N. Wabash Avenue, Chicago 1, Illinois.

PACKAGING ENGINEER

2 or 3 years package engineering experience with metal, glass, and plastics. For evaluation of containers and container materials, caps, closures, and aerosols, in chemical specialty field. Contacts within company and with suppliers will be extensive and important. Engineering degree required preferably mechanical. Excellent opportunity in new position in our Research and Development Division. Send complete resume to: Mr. W. H. O'Shaughnessy, Johnson's Wax, Racine, Wisconsin.

Packaging Engineer—Expanding research activity offers excellent opportunity for creative design engineer in food packaging. Design and adapt packaging machinery for product development section of Minneapolis laboratories. Applicants should have engineering degree plus equipment design experience. Send detailed resume and salary expectation to Mr. C. A. Butler, The Pillsbury Company, Pillsbury Building, Minneapolis 2, Minnesota.

Chemist-Group Leader—National food company located in Chicago suburb has challenging opening for experienced chemist to conduct research & development work on adhesives, coatings, lacquers, inks & solvents for cellophane, polyethylene, paper & foil. Should have 3 to 5 years pilot plant experience plus laboratory training. Some traveling required. Salary open. Please reply to Box 1103, **Package Engineering**, 185 N. Wabash Avenue, Chicago 1, Illinois.

Representatives Wanted—To handle line of well-known metal cleaning and preservation tanks, silica gel, etc. Calling on aircraft and missile mfgrs. California, Ohio, Texas, Michigan, Wisconsin, good commission. D. C. Cooper Co., 1467 S. Michigan Ave., Chicago 5, Illinois. Telephone: HA-7-8046.

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For Sale—Two Pneumatic Scale High Speed Packaging Lines (like new) complete with small double package makers, two scale fillers, top sealers, Exact Weight selectometers, A-C metal detectors. Also compression belts, labelers, staplers, Spee-Dee filler, bag sealers, shakers,roller skate conveyors, belt conveyors, pallet trucks, skid trucks, scales, case sealers, S. S. conveyors, and many items of Processing Equipment. What do you need? Please reply to Mr. J. J. McCabe, American Maize Products Co., Roby, Indiana. Telephone: Whiting 2000.

What we think

"Civil service thinking" slows packaging progress

In spite of today's lip service to creativity and of so many companies professing allegiance to technical progress, we think today's packaging is seriously handicapped. Too many packaging men are forced to go about their tasks in an atmosphere of subtle but pervasive restrictions. While we marvel at the progress of our field and speak of it with particular pride as "fast moving," we wonder how much faster it could move if given a real chance.

There is too much "civil service thinking" in business —and we mean "civil service" in its most deadening, routinizing context. We emphatically do not refer to the countless dedicated government scientists and specialists doing landmark work under great handicaps. Knowing a lot of them personally, we are convinced they dislike the deadening effects of bureaucratic orderliness even more intensely than we do. Our point is that "civil service thinking" no longer carries merely the implication of employment in some government agency.

Arnold J. Toynbee, famed British historian, recently brought all this home graphically and forcibly. He reminded the 50th anniversary conference of the Harvard Business School Association that the term "business" seems now associated more with "administration" and "organization" than with "enterprise" and "profit." In other words, working for the government and working for a corporation are becoming increasingly similar.

It shouldn't have happened to the Romans

Back in Greco-Roman days, government proved hopelessly inadequate and businessmen literally took over. But in spite of their devastating excesses, these entrepreneurs proved their ability to come up with dynamic, expanding organizations. In time Augustus changed all this, induced these businessmen to become dutiful civil servants, and brought about peace and good order. All this lasted about 200 years and subsequent events proved that the price for so comfortable and orderly an existence was too high, Mr. Toynbee explained.

Creativity withered on the vine. Life became dull and deadening. Nobody wanted creative personalities around because they were so disturbing to society. The same situation that gave those Romans such a dull experience is with us today. It is the trend that is going to hurt packaging and other dynamic functions unless checked.

The trouble with so many governmental agencies and large corporations is that the *means* of doing the job becomes more important than the job itself. You get more engrossed in following an established pattern and maintaining the smooth interaction of complex relationships than you do in attaining the object of all this action.

There is a stifling aura of orderliness which militates against the kind of disruption of routine that creative thinking injects. It is fine for the men at the top of large corporations to tell the press and the stockholders how interested they are in progress and creative thinking, but somewhere along the line things bog down.

Let's not fall into this trap ourselves

A packaging man is in a unique position to do something about this because he gets into so many different departments of his company. It is true that when he wants to install some production line innovation or bring about a radical change in structural package design, he has to "clear" it with a lot of people. If he by-passes them in striding toward his objective he gets into trouble.

We know we are asking many a packaging man to make himself a sitting duck when we urge him to strike out on new lines of fresh approach and creativity. Since so many organizations have fallen unconsciously into the "civil service mentality" point of view (which considers it better to follow correct procedure than to get desirable results), it takes real courage to be a packaging egghead, radical, or oddball.

For the practical packaging man whose plans are blocked by an unimaginative, bureaucratic middle and upper management, we admit the problem is a tough one. But we offer as a warning to all concerned our assertion that the trend towards "civil service thinking" has got to be reversed. Distinguished scholar Toynbee has done us a great service in bringing the problem into sharp focus. It is up to us to do something about his timely warnings.

Bruce Hollingsworth

Editor

The Ludlow Line Protects Your Products Better

Characteristics of Ludlow's new plastics include heat sealability, thermoformability, printability and excellent resistance to greases, flavors and acids.

What can Ludlow's new plastic films do for you?

Ludlow's newly developed FLEX-L process is producing a whole new line of unusual plastic films. It includes PROPLENE, a high-gloss packaging film made from a polypropylene resin (a Ludlow "first") and CAPLENE, an exceptionally strong and clear film made from nylon-6.

Medium and high density polyethylene films, METAPLENE-A and PARAPLENE, have remarkable high gloss and clarity. These films and a new foam sheeting (METAFOAM) are printable and heat-sealable. Their thermoforming characteristics and shelf life are exceptional. Packagers throughout industry have acclaimed these products.

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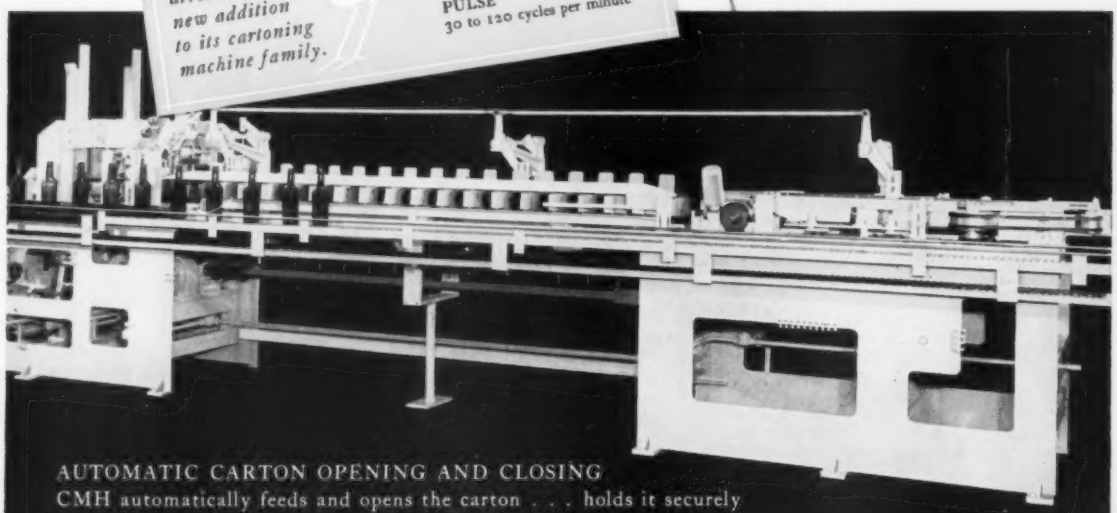

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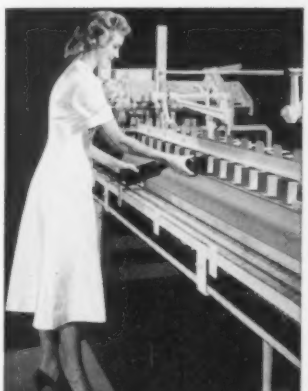

LOADING—Operator's sole function is to slide the product into the end of the carton . . . all other operations completely automatic. Loading area can be designed to accommodate one or several operators.

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